

**PUBLIC HEARINGS
NANTICOKE WASTE
MANAGEMENT LIMITED
WASTE DISPOSAL SITE
(LIQUID INDUSTRIAL WASTE
TREATMENT AND LANDFILL
FACILITIES)**

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Environmental
Assessment
Board

ENVIRONMENTAL ASSESSMENT BOARD

REPORT

on the

PUBLIC HEARINGS ON THE APPLICATIONS BY
NANTICOKE WASTE MANAGEMENT LIMITED TO THE
ONTARIO MINISTRY OF THE ENVIRONMENT FOR
APPROVAL OF A WASTE DISPOSAL SITE WHICH
WOULD INCLUDE LIQUID WASTE TREATMENT AND
LANDFILL FACILITIES DESIGNED TO HANDLE
HAZARDOUS INDUSTRIAL WASTES

HELD BEFORE:

Mr. D. S. Caverly,
Board Chairman and
Hearing Chairman,

Mr. D. C. Morton,
Board Member,

and

Mr. G. E. Wilson, P.Eng.,
Board Member.

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INTRODUCTION

This is a report on two public hearings of the Environmental Assessment Board held concurrently commencing on June 7, 1977 and terminating in February 1978 regarding applications by Nanticoke Waste Management Limited for Certificates of Approval for a waste disposal site which would include facilities designed to handle liquid waste treatment and the landfill of hazardous industrial wastes. One hearing was required under Section 44(1) of The Ontario Water Resources Act for the approval of sewage treatment works for the treatment of industrial wastes and the other hearing was required under Section 33a(1) of The Environmental Protection Act, 1971 for approval of a waste disposal site for the disposal of hauled liquid industrial waste or hazardous waste. Copies of the above Applications appear as Appendix A of this Report.

The site is proposed to be located on Lot 6, Concession IV (in the former Township of Walpole), City of Nanticoke. It would consist of approximately 100 acres.

Before the commencement of the hearings, notices were placed in various newspapers serving the local area, and notification was sent to the clerks of the municipalities in which the site was proposed to be located, as required by the Acts. Owners and/or occupants of lands adjoining the proposed site, and other parties who were considered to have an interest in the hearings were also notified.

At the hearings, all persons who appeared were given full opportunity to be heard, to make representation by counsel or agent, and to raise questions regarding the subject matter of the hearings.

A total of 43 morning, afternoon and evening sessions was held by the Board with most of them being held in the Jarvis Community Centre. Sessions were also held occasionally in the Community Hall in the hamlet of Nanticoke and, on two days, in the Port Dover Public School.

During the course of the hearings, 163 exhibits were filed with the Board as evidence regarding the subject matter of the hearings. The exhibits were in the form of reports, briefs, letters, analysis sheets, conceptual drawings, photographs, maps, site plans, etc.

A verbatim transcript totalling 24 volumes and 4,354 pages was made of the evidence given at the hearings. A list of all counsel and the main participants is given in Appendix B of this report. A chronology outlining the participation by the Applicant, the witnesses and the public appears as Appendix C. A list of all the exhibits submitted at the hearings is provided as Appendix D.

The sitting members of the Board heard many views and extensive evidence from all participants at the

hearings. The Applicant provided details of the proposal, along with considerable information on the method of operation, including the laboratory controls which would be used to protect the environment. The Board made a departure from its past procedures by hearing evidence on the financial stability of the Applicant.

The Ministry of the Environment, in presenting evidence by some 12 witnesses, stressed the need for such a facility, pointing out that present installations in the Province are not capable of handling the volumes and types of hazardous industrial wastes now being generated, and that no other applications for facilities, similar to those being proposed, were before the Ministry. The Ministry's technical assessment of the proposal indicated that, in their judgment, the effect on the environment would be minimal.

The sitting members of the Board heard numerous presentations and much evidence from those in opposition to the proposal. A night sitting on Tuesday, September 27, was devoted entirely to hearing from the public. Those present were concerned with the effect of this proposal on their properties, Nanticoke Creek and Long Point Bay, their way of life, and their health and well-being.

The Board recognizes the need for an industrial waste treatment facility in the Province and the

importance of such a facility in the light of the Province's overall responsibility for ensuring the proper management and control of hazardous industrial wastes.

The Board, in receiving the views and concerns of adjacent residents and landowners, considered not only those matters of immediate concern to the Ministry, including the proposals for the lessening of the impact of the project on the surrounding area, but also such other matters as the social effects of the project, and the possible deterioration of the quality of life of those living nearby and in the general area.

OBSERVATIONS

The Board, having considered the evidence presented at the hearings, makes the following observations:

1. It is important to emphasize that the treatment and/or disposal of toxic and hazardous wastes is quite different from the function of a typical landfill or sewage treatment facility which disposes of inert and/or bio-degradable waste materials.
2. There is general agreement that there is a need for a facility in the Province of Ontario at which toxic and hazardous wastes can be rendered harmless, recycled or disposed of, with a minimum impact on the environment.

3. The protection of the environment necessitates that toxic and hazardous liquid and solid wastes requiring treatment and/or disposal be viewed as unique and deserving of special consideration. There should be appropriate precautions and criteria established by the Ministry of the Environment for the site selection, design, operation and security of any facility for the reception, treatment and containment or disposal of such materials.
4. In the consideration of the environmental effect of such a facility, the selection of the site is a significant factor. This requires the use of specialized techniques which are consistent with a concern regarding direct and potential environmental impact both on present and on future generations.
5. It is believed that criteria can be developed for suitable sites where the risks and the environmental effects would be minimal. These criteria must make allowance, among other matters, for the failure of liners, other protective devices or operating procedures.
6. Adequate scientific information is available to-day, under proper management procedures and Ministry controls, to permit a choice of safe alternatives involving the neutralization, stabilization, removal or disposal of materials that are unsuited to re-use or recycling.

7. Since toxic and hazardous wastes are by-products of both municipal and industrial activities in our society, their recognition, and the need for safe disposal facilities, are responsibilities which should be accepted by society as a whole.
8. The use of this site for the purposes proposed would require an amendment to the Walpole Township Official Plan, 1967, in which the site is zoned rural and agricultural.
9. The Applicant did not appear to have arranged for the necessary easements, on either public or private property, for the installation of the effluent sewer from the facility to Nanticoke Creek.

GENERAL CONCLUSIONS

On the basis of its preceding observations, the Board has concluded that the following conditions should be met with respect to any facility designed to treat and/or dispose of hauled hazardous industrial wastes in the Province of Ontario:

1. A representative of an independent licensed inspection company who will report to the Ministry of the Environment, or, as an alternative, a member of staff of the Ministry of the Environment, should be stationed at the project. It is considered essential by the Board that such a person be present during all

the time that the facility is operating, to ensure that the detailed laboratory and operating procedures are rigidly carried out and to conduct sampling, monitoring or surveillance on behalf of the Ministry. There should be a regular plan of rotation of staff assigned to this function.

2. Effluent from the plant should be discharged to a receiving water which will provide adequate dilution. If such dilution is not available for the treated effluent, the Board feels that the effluent should be discharged to a sanitary sewer. If either such direct discharge is not possible, the effluent should be transported to the nearest sanitary facility.
3. The Ministry should routinely sample each batch of effluent before it is allowed to be discharged, have the results of the analyses certified by a Provincial Analyst and have copies of the laboratory reports made public.
4. Every effort should be made to blend the operation into the surrounding countryside. The site should be landscaped with trees where necessary, and the berms should be constructed of sufficient height to ensure adequate visual screening and should be planted with grass or other ground cover.
5. A drainage scheme should be provided around the bermed area so that there is no interference with the natural surface drainage from lands around the property.

6. Before the proponent obtains his first renewal of the Certificate of Approval for a Waste Disposal Site, he should be required to appear before a public hearing of the Environmental Assessment Board. This hearing, held at the direction of the Ministry of the Environment, would provide an opportunity for evidence to be heard from the Ministry and from other parties, on the operator's past performance at this site.

RECOMMENDATIONS

The Board, after considering the information presented and the views expressed at the hearings, recommends that:

- the Application for the approval of sewage treatment works for the treatment of industrial wastes to be located on Lot 6, Concession IV (former Township of Walpole) City of Nanticoke not be approved.
- the Application for the approval of a waste disposal site (landfill) for the disposal of hauled liquid industrial waste or hazardous waste, to be located on Lot 6, Concession IV (former Township of Walpole) City of Nanticoke not be approved.

REASONS FOR RECOMMENDATIONS

The Board makes its recommendations for the following reasons:

1. The Board feels that the hydrogeology of the site is critical to the successful operation of the project and the protection of the environment. It considers that the information provided at the Hearing was insufficient and tended to be contradictory, especially with regard to the soil permeability at the site, and the location of the water table. The hydrogeologic considerations relating to the design of the secured landfill facility, put forward by the proponent, differed substantially from those of the proposal submitted later in the Hearing by Dr. George Hughes of the Ministry of the Environment. Evidence failed to show clearly which was the better design.
2. The landfill proposal of the Applicant was based on a liner, the life of which was not predicted to extend for the full lifetime of the landfill. The resulting problem of how to handle the leachate, following the deterioration of the liner, was not addressed to the Board's full satisfaction.
3. The leachate will be generated at this site in perpetuity, and will necessitate perpetual monitoring and handling. No firm indication was given at the hearings as to who will be responsible for continuing

this operation after the site is closed. Furthermore, the presence of these monitoring facilities in the vicinity of the developing industrial area is considered by the Board to be an undesirable long-term land use.

4. It was indicated that groundwater from private wells was already of borderline quality, although suitable for livestock watering, and that water was being trucked in for household use. Therefore, anything which might further adversely affect the groundwater quality of this area would not be acceptable. ✓
5. The Applicant proposes to discharge the effluent to Nanticoke Creek. Because of the variation in both the seasonal and yearly flows of Nanticoke Creek, the Board is concerned that the Creek may not maintain the necessary flow requirements for dilution purposes during those periods when the treatment facility is discharging to it. ✓
6. Evidence presented at the hearings raised some doubts in the minds of the members of the Board as to whether the proposed liquid waste treatment plant would be able to produce an effluent which, even after dilution, would meet the requirements of the Ministry of the Environment's water quality criteria for all of the critical parameters. ✓

7. The limited information on site selection, and the absence of a comprehensive report covering all aspects of the search for a site, were viewed as significant omissions.
8. The berms proposed by the Applicant were not, in the Board's opinion, sufficiently high. Furthermore, the proposal did not contain provision for adequate visual screening along the east and south sides of the property which face existing municipal road allowances.
9. The Applicant did not propose the provision and maintenance of a drainage system which would protect those properties adjoining the site, following the installation of the berm around the entire facility. The Board considers such a system to be necessary.
10. Although reference was made on more than one occasion, during the course of the hearings, to the necessity of setting up a contingency plan to be put into operation in the event that either the wastewater treatment facility or the landfill facility did not operate as expected--thereby giving rise to an emergency situation--no specific details, even in conceptual form, were provided by the Applicant as to what would be done in such an eventuality. Considering the hazardous nature of the wastes being handled, the Board feels that

a clearly defined contingency plan should have been formulated by the Applicant and presented at the hearings. The Board was also concerned that no specific details were provided by the Applicant concerning the establishing of a contingency fund which would be available, both during the operation of the facility and following its close, to meet unforeseen costs arising from either its operation or future surveillance. The Board considers the absence of such a contingency plan and contingency fund to be serious deficiencies in the Applicant's proposal.

11. There was considerable opposition to these applications from private citizens and groups, and from the local and regional municipalities. The Board weighed the concerns of adjacent residents and landowners and is of the opinion that such concerns are valid, although the technical and engineering concepts of the proposal appear, for the most part, to be satisfactory. The Board feels, therefore, that this project could eventually have an adverse effect upon the livelihood of local citizens resulting from air pollution or the possible release to the ground or surface water supplies of the area of toxic or undesirable materials.

SUMMARY OF EVIDENCE PRESENTED AT THE HEARINGS

PHILOSOPHY BEHIND THE HEARINGS

It is appropriate, at this stage of the Report, to outline the basic philosophy which underlies the Board's consideration of the evidence which was brought before it at these hearings. The legislation governing the hearings indicates that "the report of the Board shall contain a summary of the information presented and the views expressed at the hearing...".

Both during the course of the hearings themselves, and in reviewing the evidence afterward in the preparation of its Report, the Board must give consideration to the following questions: How much emphasis should be placed on the technological evidence presented at the hearings? What attention should be given to the social impact of the project and the concerns of local people? To what degree must consideration be given to the general need for the project as opposed to the local distaste for it? While each hearing is different in the amount of detail required, sufficient information must be obtained from the Applicant to enable the Board to come to a firm conclusion on the merits or otherwise of his proposal.

While a certain amount of detail is, therefore, necessary, the Board acknowledges that much of the information presented at the hearing is, of necessity, of a preliminary or conceptual nature. In other words, in the normal approvals process, it is not expected that all details of the proposal should be available at this stage. It is important, on the other hand, for the public to be involved at this stage so that it may have an opportunity to question, evaluate and make clear its position while there are still alternatives available in the decision-making process.

The Board views a public hearing, therefore, as having two principal objectives. The first is to provide the public with an opportunity to understand the Applicant's proposal and to question him, as well as others participating in the hearing, with respect to the implications of the proposal on their lives and the community in which they live. The second is to enable the Board to hear evidence in a public forum concerning the proposal and to formulate a recommendation on all the evidence, including the input from the public, so that it may make its report to the Ministry of the Environment.

PRELIMINARIES

On the first day of the hearings, June 7, 1977, Mr. D. S. Caverly, Chairman of the Board, and sitting Chairman of these hearings, opened with introductory remarks concerning the purpose of the hearings, namely, the consideration of the applications made by the Applicant, Nanticoke Waste Management Limited, for a waste disposal site which would include facilities designed to handle liquid waste treatment and the landfill of hazardous industrial wastes. He gave a brief explanation of how the hearing would be conducted and then called upon the counsel or representatives of the various parties to identify themselves. They were as follows:

<u>Counsel</u>	<u>Representing</u>
Mr. M. P. Forestell Mr. D. C. Hugill	- the Applicant, Nanticoke Waste Management Ltd.
Mrs. L. McCaffrey	- The Director, West Central Region, Ministry of the Environment.
Mr. T. A. Cline	- Regional Municipality of Haldimand-Norfolk
Mr. A. Winter	- City of Nanticoke
Mr. L. Thibideau	- Haldimand Federation of Agriculture
Mr. W. Kelly	- Citizens Committee for the Preservation of the Environ- ment and the Jarvis Board of Trade

<u>Others</u>	<u>Representing</u>
Mr. G.I. Miller, M.P.P.-	The Constituency of Haldimand-Norfolk
Mrs. E. Huxley	- Port Dover Board of Trade
Mr. F. McCarthy	- Hagersville Water Improvement Committee
Mr. R. Hunter	- Haldimand-Norfolk Conserva- tion Authority

Mr. N. Borkovich, Counsel for the Nanticoke Ratepayers Association was not present on June 7, 1977 but commenced his participation at the hearing on August 9, 1977.

During the opening discussions, the Chairman received a request from Mr. Winter for an adjournment of the hearings. This request was supported by Messrs. Cline, Thibideau, Miller, Kelly, McCarthy, Hunter and Mrs. Huxley. Mr. Forestell wished the hearing to proceed, while Mrs. McCaffrey felt that the hearings could proceed provided certain procedures were followed.

The Chairman stated that, before he ruled on an adjournment, he was prepared to hear from people who had come to the hearings prepared to comment on the proposal.

Mrs. Huxley said that a detailed study of the proposal should be supplied by the Ministry of the Environment to the City of Nanticoke and its electorate at an open evening meeting so that clarification of technical

the present site were to the effect that such facilities are not necessary for their proposed purposes.

The Steel Company of Canada Limited, through its Environmental Control Manager, Mr. H. Eisler, pointed out that it was interested in the proposed waste disposal facility because it was a neighbouring landowner.

However, he stated that his company anticipated that the generation of liquid waste in the first stage of the steel plant, and in the first stage of the industrial park, would be minimal or non-existent. For this reason, they were not promoting, in any way the installation of this waste disposal facility at this location at this time.

Mr. T. W. Drew, President of Nanticoke Waste Management Ltd., the Applicant, when questioned by Mr. Forestell, stated that he had, however, been dealing with one of the steel industries in mill scale recovery which seemed to be a problem in steel industries throughout the world. (He said that this problem had been discussed with engineering firms in England as well.)

According to Mr. Drew, it became evident to his company in 1974 that private enterprise was not responding to the needs of government and industry by providing adequate waste treatment and disposal facilities in Ontario. He said that Ontario industry is estimated to generate, annually, in excess of 40 million gallons of liquid waste, excluding waste oils. Present disposal

sites are rapidly being restricted to specific waste streams and, in some cases, being closed to further use. For several years, he said, his parent company, D&D Disposal Services Limited, has transported various wastes to the United States for disposal due to the lack of approved facilities in Ontario. He added that the message that the international border will ultimately be closed to waste is becoming abundantly clear.

Ms. J. Opperman of Pollution Probe, Toronto stated in a brief that Pollution Probe does not accept the assertion that industrial wastes must be produced at all. She stated that her Group required that the following three conditions should be satisfied before the Board considered approving the Application: (a) the Applicant should indicate that the wastes cannot be reduced at their source, (b) the waste exchange studies of the Ontario Research Foundation and the federal waste exchange project, under the auspices of Environment Canada, be evaluated, and (c) information on alternative techniques for the collection of industrial wastes that permit their reclamation and reuse be obtained. She expanded on this philosophy, based on the need for waste management in the original production of materials, their reuse and their recycling.

In a brief presented to the Board, Mr. E. Turner, Assistant Director, Pollution Control Branch,

Ministry of the Environment, (referred to henceforth as "the Ministry"), estimated that there were approximately 40 million gallons of liquid industrial wastes being disposed of in Ontario each year, exclusive of waste crankcase oils which constitute a major portion of the waste oil recovery business. These forty million gallons can be divided roughly into two categories comprised of about twenty to twenty-five million gallons of inorganic waste, and fifteen to twenty million of organic waste (which, for clarification purposes, he termed as those which could be disposed of by incineration). Mr. Turner, in his brief, mentioned that a number of the treatment and disposal facilities presently in use were either in themselves creating environmental problems and were in need of upgrading, or were scheduled for closure in the near future. He indicated that waste crankcase oils, other waste oils, spent organic solvents, spent pickle liquors, and spent caustic soda were being handled by one of the following methods: recycling, incineration, recovery, reclamation, road oiling or other uses.

Mr. Turner stated that, although every company was required to dispose of its wastes in a manner which will not do any harm to the environment, individual companies had found that it was uneconomical, for a number of reasons, to undertake treatment and/or disposal. As a result, a waste treatment disposal industry had developed

over the past few years, as a separate industry, and it had undertaken to accept these wastes from the industries that were generating them, and treat and/or dispose of them in an appropriate manner. At the present time, Tricil Waste Management Limited had two incinerators which, essentially, could handle the organic materials that were available for disposal. Insofar as the inorganic materials were concerned, most of these were disposed of by landfilling in two major sites--the Beare Road landfill site in Toronto and the Upper Ottawa Street North landfill site in Hamilton. There were other landfill sites accepting relatively small quantities of waste throughout the Province. In addition, the two incinerators mentioned above were also handling what, essentially, were inorganic wastes, with resultant operational problems.

Mr. Turner said that the Ministry felt that waste treatment facilities were required as close as possible to those areas where there was a complex of industries, such as in the Hamilton, Toronto, Niagara and Sarnia areas and, to a minor extent, near Guelph, Cambridge, London and Kitchener. It was also the belief of the Ministry that, with the development which will take place in the Nanticoke area with the three industries that were presently there, and the other industries which were proposed, there would, eventually, be a need for

facilities to handle wastes generated in that area. He said that he had reason to believe that there would be waste generated in this area which would require disposal and that, in fact, the companies in question had not yet really resolved how they were going to dispose of them.

As a result of the problems being faced in the Province with the disposal of industrial wastes, he said, there was a desperate need for facilities to treat and/or dispose of inorganic industrial liquid waste.

METHODS OF TREATMENT OF LIQUID HAZARDOUS AND TOXIC WASTES AND THEIR PRESENT STATUS

Mr. Turner indicated that there were a number of methods whereby liquid industrial wastes could be treated and disposed of, such as, recovery, reclamation and reuse, landfilling, incineration, various types of physical or chemical treatment, solidification or chemical fixation, deep well disposal and any combination of these.

It was Mr. Turner's belief that recovery, reclamation and reuse of materials from liquid industrial wastes is generally uneconomical in the Province of Ontario, under the present scheme of things, due either to the need for complex treatment process or the fact that the wastes are generated randomly or are too small to make treatment investment viable. Therefore, there has been very little effort made by industry to recover materials.

This is the situation in spite of the fact that there are processes available for recovering most of the heavy metals from the plating industries. He mentioned, for instance, using pickle liquors from the steel industry for phosphorus removal at sewage treatment plants; upgrading caustic soda from the oil industry for use in the pulp and paper industry; and processes for reclaiming oils, iron salts, silver and zinc.

He stated that landfilling, whereby the liquid waste was poured into the ground or into a hole at the landfill site, had been going on for years. It has been known for some time that a landfill site which accepts solid waste, including domestic garbage, has an ability to absorb a certain amount of liquids which can be beneficial to the processes that go on in a landfill site. These landfill sites then become storage ponds and potentially have the capability of contaminating ground water.

In his testimony, Mr. Turner further advised that the Beare Road landfill site in Metropolitan Toronto which had handled as much as five to six million gallons a year and lately, was handling three to four million gallons a year, was now saturated with liquid to the point where liquids are leaching out and are having to be sprayed back onto the site. At the time of the hearing, Metropolitan Toronto had indicated that it would not accept liquid industrial wastes into this site after

December 31st, 1977. He added that the only other major landfill site for disposing of this type of wastes is at the Upper Ottawa Street North site in the Hamilton area which is operated by the Regional Municipality of Hamilton-Wentworth. This landfill site has been accepting liquid wastes from the general Hamilton area for a number of years. It is due to be closed down in about a year from now (approximately September 1978). This site handles about five million gallons per year.

Mr. Turner stated that the two incinerators that were being operated by Tricil Waste Management Limited were handling substantial quantities of inorganic wastes which should be more appropriately handled by other means. The result has been pollution problems. A control order of the Ministry of the Environment has already been placed on one of the incinerators and, at the time of the hearing, one was about to be issued on the second. He said that the Company had indicated that the capital expenditure required to upgrade either/or both of those incinerators to the point where they could satisfactorily handle the inorganic wastes was such that the facility would not be viable.

Mr. Turner indicated that it was possible to construct an incineration system with appropriate scrubbers and other equipment to handle inorganic waste. There still is the problem of getting rid of the resulting

solid material and of treating the scrubber effluent.

He stated that the solidification or fixation process being experimented with at the Upper Ottawa Street North site in Hamilton was based on silicate chemistry, whereby liquid industrial wastes can be turned into solids. These solids, which look like natural clay, appear to retain the toxic components of certain types of inorganic wastes and bind them securely so they are not leached out by rainfall or exposure to water. The problem is that there are no data available to substantiate the claims of Ontario Liquid Waste Disposal Limited, which has patented the process, and thus the need for the experimental facility. The fixation process is being used to treat an additional two million gallons, approximately, per year.

The next method of possible treatment described by Mr. Turner was the physical chemical process. After any possible reclamation and recovery has been carried out, the first step is an adjustment of the pH to the optimum figure, depending on the waste materials and what is needed. The object is to bring the pH close to neutral and to precipitate the inorganic heavy metals which are the toxic components of the wastes. The precipitation generates solids which have to be disposed of. To date, they are generally landfilled. Chemical oxidation or reduction may also be involved in this step of the process.

The next step described by Mr. Turner was the reduction of the organic contamination left after the precipitation process. This can be done by using activated carbon and/or biological or biochemical treatment. The organics removed by the activated carbon are destroyed by heating the carbon to a very high temperature. The biological oxidation also generates solids which have to be disposed of, unless a long term type of biotreater is used.

A possible component of the physical chemical treatment is the Wetox system in which organic materials in the liquid phase are oxidized under conditions of pressure and temperature to carbon dioxide and water, in much the same way as would be done in a biological treatment process. This process, according to Mr. Turner, has an efficiency of removal of ninety-five per cent which, he said, was completely unsatisfactory when toxic materials were being dealt with.

With the heavy metals removed, there is still the inorganic material in solution, the disposal of which may create a secondary disposal problem. Disposal options, at the present time, are to evaporate the water, discharge the solution to a watercourse, put them into the ground as landfill or into a deep well. Therefore, the Ministry is prepared to allow the discharge of a solution of inorganic salts from this type of treatment.

Mr. Turner did not say that this was necessarily the best treatment but he said it was an acceptable one, provided that the quality of the waste which was being proposed for discharge was acceptable also.

Mr. Turner stated that the liquid which has to be disposed of was known as a brine solution and would contain inorganic sulphates, chlorides, possibly some nitrates, and salts of non-toxic substances such as sodium, potassium and calcium. The combined concentration of the salts would be in the order of one to two per cent, or 10,000 to 20,000 parts per million.

The last alternative that Mr. Turner mentioned was deep well disposal. In this disposal process, the solids are removed from the wastes which are then adjusted to a pH which is acceptable with respect to the fluids that exist naturally in the formation itself. The wastes are then pumped into the subterranean formations of rock which are porous and capable of absorbing or accepting the liquids.

In Ontario, there are two subterranean formations that can be used for this purpose. One of them is the Detroit River formation which, by regulation, cannot be used for this purpose at the present time, and the Cambrian formation which is much deeper. No wells are used for this disposal purpose in this formation in Ontario at the present time.

Mr. Turner indicated that deep well disposal is regarded as a technically sound method of handling waste and he personally felt that deep well disposal of the brine solutions, resulting from the physical chemical treatment, was an appropriate method to use.

APPLICANT'S PROPOSAL

BACKGROUND INFORMATION

Mr. Drew explained how D&D Disposal Services Limited, which was incorporated in 1970, had become involved in transporting liquid industrial waste from Ontario to the facilities of Chem-Trol Pollution Services Incorporated (Chem-Trol) in New York State. The need that became evident led to the proposals being considered at this hearing.

He stated that there had been several discussions with officials of the Ministry of the Environment concerning this matter and it had been decided that an appropriate site for the company's new facility would be adjacent or in close proximity to the Lake Erie Industrial Park at Nanticoke.

He explained that the company had approached the Council of the Region of Haldimand-Norfolk and of the City of Nanticoke regarding its plans. It had attempted to make it clear to all government bodies that its facility was designed to process wastes from the immediate area but

that until local industries could generate sufficient volume to keep the company's operation profitable, it intended to process wastes from outside the region.

Mr. Drew claimed that economic and environmental benefits would result from the establishment of such a facility. He cited these benefits as the liability of environmental contamination being limited to one area, firm control being exercised over the quality of discharge of the effluents, and expensive and sophisticated equipment being employed which couldn't be afforded by smaller industries.

Mr. Drew stated that they proposed to set up facilities to handle non-municipal wastes having environmentally hazardous properties. The plant would include holding facilities for blending and accumulating, and pre-treating facilities to render wastes amenable to normal approved waste disposal procedures. The water component of the wastes would be composed of acidic, alkaline and organic wastes, all of which would have very low percentages of contaminants. Large volumes of oils or solvents would be routed to other facilities for recovery or use as a low grade fuel. He said that during D&D Disposals' association with Chem-Trol, his firm had come to recognize Chem-Trol's expertise and thus had the latter firm develop the disposal processes being proposed.

SCIENTIFIC CONSIDERATIONS

LIQUID WASTE TREATMENT

Mr. D. J. Kuhn, a chemical engineer, presently President of Secured Contractors Incorporated, indicated that he had done the preliminary engineering plan layout for this proposal when he was employed with Chem-Trol. He provided more specific information regarding the control procedure, the chemistry behind the proposal and how it would operate.

He stated that some industrial waste, such as radioactive or pyrophoric materials, would not be accepted at the plant. A sample of a waste proposed for treatment would be prescreened and checked in the company's laboratory before being accepted. A trial shipment would be sampled, checked and approved by the laboratory before it was unloaded. All succeeding loads would be checked by qualified chemists in order to protect the environment, their staff and equipment. He said that there would also be quality control throughout the plant. If anything went wrong, the system could be shut down, the waste could be adjusted or the material could be taken back and run through again. He said that the effluent from the lagoons would be discharged only after the waste has been batch treated and quality controlled, and when final approvals have been given and parameters approved to meet all specifications.

Using an artist's conception of what the site would look like when it was built and in operation, Mr. Kuhn gave an overview of the water treatment process. Incoming approved wastes would be pumped into lagoons lined with an acid-and-alkali-resistant chlorinated polyethylene liner. Wastes which had a beneficial effect on each other would be mixed while being pumped to another lagoon, where they would be neutralized with hydrated lime, if necessary. The resultant sludge would be put in a lined pit and later deposited in the secured landfill. The liquid remainder would be checked for quality control and for chemical content. If not satisfactory, being a batch system, it would be pumped back to the start of the operation. If satisfactory, the liquid remainder would go through the activated carbon column for further removal of colour, organic material and other contaminants. From there it would go to an aerated pond, followed by quality control and then discharged to one of two ponds where it would be biologically degraded by micro-organisms. From these ponds the waste would be discharged on a batch basis, providing it had been analyzed and the results met the requirements of on-stream discharge of the Ministry of the Environment. The effluent would be discharged via controlled pumping to the Nanticoke Creek approximately one mile away. If the contents were approved by the Ministry it could only be discharged at a dilution ratio

of 100 to 1, when there is a minimum of 15 cubic feet of water per second flowing down the creek, and at certain times of the year. He stated that back-up documentation was contained in the Applicant's proposal.

Under cross-examination, Mr. Kuhn stated that he had prepared the preliminary conceptual design, based on the technology used at Chem-Trol and the information on volume and types of wastes, the types and thicknesses of the underlying soil, and the location of the water table provided by Mr. Drew and his consulting hydrogeologist. The design capacity was based on an estimated 83,000 gallons of waste per day. He stated that the technology would be the same as at Chem-Trol but the physical configuration would be considerably different and better. He indicated that, since this was a preliminary design, the depth of the lagoons would be altered to conform with the information on the depth of the water table (which he was told was at 20 feet).

He indicated that there would be curbed concrete pads around the area where the incoming waste was to be received in order to contain any spills that might occur during unloading.

Mr. Kuhn pointed out there would be a clay-lined secondary berm around the entire facility where the hazardous waste materials were being stored. The liquid in the lagoons would be kept two to three feet below the

top of the berm at all times and a high-level alarm would sound should it go above that level. The entire area would be surrounded by a periphery berm to prevent spilled material from escaping from the property.

According to Mr. Kuhn, the tensile strength of the liner to be used would be 1600 to 1700 pounds per square inch. He then described how the liners would be installed. He said that the weight of the liquid in a lagoon would hold the liner down in an unaerated lagoon. In a mechanically aerated lagoon weights would be used to hold the liner down.

Mr. Kuhn stated that the life expectancy of the liner in the lagoons was hard to predict. He said that they have to be inspected by cleaning out the lagoons on a two- or three-year basis. He had been told that liners that had been in service for seven years were in good condition. He felt that such liners were better than concrete units because they are flexible and not attacked by the acids and alkalies. If a leak developed he claimed it was much easier to get the material out and remove and repair the liner than it would be if it were concrete. Concrete liners were also more expensive.

In the event of a leak in a liner, lysimeters, which surround each lagoon, will permit leaked waste to be detected. He felt that 99.5 per cent of the time the material could be collected before it did damage to the

environment. If it did reach the ground water, a well could be dug at the plant site and the contaminant could be pumped out. He agreed that a perforated pipe underneath each lagoon, which could be used to collect the wastes for pumping in the event of a leak, would be advantageous.

Mr. Kuhn mentioned that the odour potential from the liquid waste treatment would be controlled by not accepting very odourous types of wastes, by not operating any organic distillation facilities and by not allowing any of the lagoons to go septic. He doubted if any ammonia would be detected off the property site.

Mr. Kuhn indicated that the discharge to Nanticoke Creek was chosen because there was no sewer line nearby. A separate sewer discharging directly to Lake Erie would be two and one-half miles long and the conditions at the discharge point were not known.

In case of a heavy rainstorm, the lagoons would be adequately sized or would have sufficient height above the liquid level to accommodate any expected volume of rain.

Mr. Stadelmaier, President, Recra Research Incorporated, described the waste water reclamation system in more detail. He had been closely involved with the development of the Nanticoke Waste Management project when he was director of research for all of the facilities of

S.C.A. Services Incorporated (of which Chem-Trol is a wholly-owned subsidiary).

The system would begin with a lagoon which would receive acidic materials that are mostly chemically-reducing in nature. The other lagoon would contain aqueous waste materials and waste oxidizing agents. By mixing waste oxidizing agents with waste materials under the proper conditions, beneficial results will occur to both wastes. The material in these two receiving lagoons would be blended in a third lagoon called the Redox lagoon where there would be a reduction in oxidation. An excess of the reducing acids would be put into the Redox lagoon where lime would be added to raise the pH into the alkaline region. At this point, the heavy metals that are contained in the waste materials would be precipitated as solids. The acid component of the waste would react with the hydroxide of the lime to produce water. The solids which are separated in this process would be collected and dewatered, to the greatest extent possible, using physical means, and then deposited into the secured scientific landfill, which will be discussed later. The liquid material which results from this neutralization operation after it is separated from the solids would be passed on to a holding lagoon where more lime or sodium hydroxide is added to raise the pH above the number 11. At this time the waste water would be aerated to drive off the ammonia.

According to Mr. Stadelmaier, the air stripping of waste waters to remove ammonia is a well known technology.

Ammonia must be driven off because it creates adverse environmental effects when discharged in any quantities to receiving waters. During this ammonia removal process by aeration, any metallic-ammonia complexes would be broken down and the metal would be precipitated into a solid that would no longer be soluble in water.

When the ammonia has been reduced to an acceptable level the material would be transferred to a pH adjustment tank to bring the waste to a pH slightly below neutrality on the acid side in order to prepare it for the next treatment step.

The waste would go through sand filters to remove small particles of solids present in the water and then would pass through the two carbon adsorption units arranged in series. This part of the system basically would remove what are referred to as the high molecular weight toxic organic compounds, such as DDT and PCB's. Also, some metals which are still present at low concentrations would be preferentially adsorbed into the carbon system.

The carbon would be transported to a regeneration site where all of the organic contaminants contained on the carbon are incinerated at high temperatures. It is not planned to regenerate any carbon at this site.

After the carbon adsorption system, the discharge from the system would be placed in a bio-aeration treatment tank or aerated lagoon where micro-organisms will consume these organic contaminants as food and deplete them. He stated that, near the end of this process, nitrification of any remaining ammonia to nitrates would occur.

From the aerobic treatment process, the material would pass on to one of two facultative ponds where any remaining organic contaminants exerting a biochemical oxygen demand would be converted into either cell mass or organic carbon forms such as carbonates. The remaining ammonia in the top layer of this pond would also be converted to nitrate. At the bottom of the pond in the anaerobic layer denitrification bacteria will convert the nitrate into nitrogen which is a harmless gas. When the food for the bacteria is depleted they eventually die and fall to the bottom of the pond.

Two facultative ponds are required because the biological process almost ceases during the winter and one smaller pond will be used to store the discharge from the previous processes. When warm weather prevails, the wastes would be aerated right in the pond and eventually would be discharged into the larger pond which would be designed to handle one year's operational flow.

Mr. Stadelmaier, referring to an analysis of waste taken from a facultative pond located on the property of Chem-Trol, (Applicant's report, Table 4), stated that the metals listed were in the low parts per million (ppm) or sub-ppm range, the 5-day biochemical oxygen demand was approximately 10 to 20 milligrams per litre (mg/l), the ammonia was 4.09 ppm and total organic carbon on a filtered sample was 52 ppm. The inference was that the waste to be discharged from the facultative pond of the Applicant would have a similar analysis. He also stated that the discharge from the facultative pond, that is, the final effluent, would contain somewhere between 1.5 and 2.5 per cent (15,000 and 25,000 ppm) of soluble salts which could include calcium sulphate, sodium chloride, calcium chloride, some potassium, magnesium and small concentrations of nitrate and bicarbonates. Most of these materials are considered innocuous to the environment.

Mr. Stadelmaier reviewed, in considerable detail, the process control function of the laboratory, the waste evaluation program, and the quality control and the process control of the operation.

He stated that no material would be accepted in the facility without a complete evaluation. Detailed information on the material would be obtained from a literature search, from knowledgeable individuals, from

the waste producer, from tests conducted by their own laboratory, and from other sources, with regard to its chemical, physical and toxic properties so that it could be determined if the particular waste product could be handled by the facility. He said that they always looked for characteristics of the waste which the system could not handle. If one is found, the waste is not accepted.

When it has been determined that a waste can be accepted for handling, the quality control specifications are set up for it. These will specify how the waste, when it is received, should be sampled and analyzed to make certain it contains only what it is supposed to contain.

The process control, as Mr. Stadelmaier described it, is the chemical watching of each individual unit operation in the plant as it is functioning. This means that samples would be taken from each operating lagoon and analyzed. The neutralization system is monitored for the correct pH. The aeration lagoon and its metal and ammonia concentrations are analyzed on a daily basis. Samples from the sand filters and carbon adsorption systems are analyzed to determine if those systems are operating properly. Further analyses are performed on the bio-aerobic treatment system. Finally, the contents of the facultative ponds receive complete analyses to make certain that every specific parameter is in line, since this is the final treatment before discharge.

Mr. Stadelmaier stated that each of these individual analyses are placed on daily production record sheets which are filed in the laboratory. They are used to show how the facility is operating and when and how corrective measures can be undertaken. They will be available for anyone to look at.

Mr. Stadelmaier, in his testimony, referred to a closed loop system in describing certain unit operations. He explained that what was meant was that any waste water from a process, such as the back wash water from the sand filters, would go back to the start of the initial process. It would follow a closed system and nothing would be put into a drain, sewer or ditch.

Mr. Stadelmaier also indicated that the company could not agree to handle a waste unless it was on the list of waste materials which it had already submitted to the Ministry of the Environment as part of this Application. Any additional materials would require supplemental approval at a later date.

Mr. Stadelmaier added that the aeration of the lagoons would be provided by floating aerators with erosion plates installed to prevent erosion of the lagoon bottom. In the case of the facultative ponds, these would also serve to keep the lower layer quiescent so that there is a top aerobic layer and a bottom anaerobic layer.

Mr. Stadelmaier provided some explanation for the problems which Chem-Trol had experienced. He cited inadequate funding in its early stages as one reason. He also stated that Chem-Trol had begun receiving wastes before its unit operations were constructed. This led to more than seven million gallons of untreated waste water being stored before any of it was processed through the system. In addition, Chem-Trol started as an incineration facility but when fuels became in short supply a lack of incineration capability resulted and the company had to change over to a waste water treatment system.

Mr. Stadelmaier was questioned at great length concerning the data shown in Table 4 entitled, "Analysis of Facultative Pond Water" of the Applicant's report and what that data represented. Table 4 gave the concentration of the individual parameters in an existing facultative pond. He said that the figures were not averages and that, at some point in time, the effluent from the facultative pond might have analyses higher than those shown in the table. He said that if the pond waters had been analyzed on a different day the results would change statistically but not in a major way. He also listed the additional data that he would want before the effluent was released. He agreed that Table 4 was not exhaustive but that it was an indication of the capability of the system with respect to the particular parameters

shown in the Table. Before the effluent was released, no input would be allowed to the pond. There would be a great many analyses undertaken, some chemical and some biological, which would take ninety days in some cases, before the results were obtainable. On those results would depend whether the pond contents could be discharged.

Mr. Stadelmaier, when questioned about the identification of the contents of the wastes being received, described a number of procedures that could be used to identify possible chemicals in a waste. He also described some of the procedures that would be used to treat a specific waste, such as sulphuric acid pickle liquor, and the physical and chemical parameters for which tests would be conducted in its passage through the system. He explained the steps which would have to be taken in the various analyses, how long they would take to perform, what the probable cost would be, and the numbers and qualifications of the staff required in the laboratory. He felt that five people could handle eight million gallons of waste in two shifts, five days a week, doing all the required tests. He explained that most of the equipment used would be automated and he listed equipment that would be needed.

He indicated that, if the supply of wastes did not provide a sufficient quantity of oxidizing agents to

completely oxidize all the organic materials which would be present in the system, the remaining organic treatment steps in the system would be able to overcome this deficiency and act as a back-up.

Mr. Stadelmaier agreed that the quality control system and the process control system were inter-related but he stated that they were not dependent on one another. They thus provided separate checks and balances. However, he wouldn't go so far as to say that it would be sophisticated enough to detect each chemical that came into the plant. He was asked how would PCB's be detected if it were not known that they were coming in. He stated that they would be detected in the carbon adsorption system because that is where they would be expected to show up if they did get into the system.

With regard to the discharge of the final pond, and the time lag that could develop between the time that the check samples were taken and the time the results were available, which could be as much as 90 days, Mr. Stadelmaier stated that an additional or third pond would be required. This would allow for the batch discharge which was considered by the Ministry to be the best method to employ because of this time lag.

He felt that once an analysis had been run on a facultative pond and the chemical and biological dynamics of the system are known, it can be assumed that the

analyses of the material in the pond is not going to change appreciably, as no further input would be allowed.

Mr. Stadelmaier explained that the technology being proposed had been proven over the years. This included, for example, the neutralization of waste materials using lime, removal of organics by carbon adsorption and biological treatment at various installations in the United States and Canada.

Mr. Stadelmaier, on further questioning, provided additional comments on the data given in Table 4 of the Applicant's report. He stated that, although he did not collect the samples, run the analysis or compile the table, he felt confident of the results because he said that standard methods would have been used. He explained in general terms the significance of the results of the analysis on oil, 5-day Biochemical Oxygen Demand (BOD), Total Organic Carbon (TOC) and Chemical Oxygen Demand (COD).

He also described the appearance and layout of the Chem-Trol site in New York State and the uses made of the land surrounding the site. He indicated that he had been involved in other sites in Michigan and Illinois but that their processes were not directly similar to the process used at Chem-Trol.

In answer to a question regarding nitrates in the treatment system, Mr. Stadelmaier stated there would

be nitrates in the wastes but that effluent would have a maximum concentration of about 20 to 30 ppm. He didn't believe that there would be any problems due to nitrates when the waste was discharged to Nanticoke Creek since it would probably be at a level of concentration that would, in almost all cases, meet drinking water standards of the World Health Organization. He said, however, that he didn't believe that the effluent would ever meet all drinking water standards but he was sure that there are times when Nanticoke Creek doesn't meet all these standards either.

Dr. Kenneth Malinowski, a Senior Scientist working in the Research and Technical Services group of S.C.A. Services Incorporated of Boston was a witness for the Applicant. He was primarily responsible for the environmental impact, the monitoring systems and the biological effects in the preparation of the Applicant's proposal. It was his opinion that the proposal would utilize the best available technology for the treatment of industrial waste.

With respect to the biological testing that would be done on the waste ready for discharge, he said the testing program would look at acute toxicity, chronic toxicity and biomagnification. From the acute toxicity test, it can be determined whether or not the waste water to be discharged will cause death to fish over a certain

period of time. Ninety-six hours is the usual time period, although other test time periods are used. From this, the concentration of the waste or lethal dose that will kill 50 per cent of the initial test fish (LD-50) will be determined. He also said that some chronic toxicity tests, which could take 60 to 90 days, would be done. The exact procedures and test organisms to be used would have to be determined between the consultant doing the tests and the Ministry. This test would indicate whether or not residence over an extended period of time in the waste water to be discharged would have any detrimental effects on the organism in terms of its fertility, its reproduction and its survival potential.

From the third test for biomagnification or bioconcentration, it would be possible to determine whether or not any components within the waste water would tend to concentrate in the tissue of the fish. This is significant when viewed in the context of PCB's in Lake Erie and Lake Ontario.

He stated that the results of analyses shown in Table 4 of the Applicant's report were of samples from a facultative pond that was ready for discharge. He said that the results were a guideline as to the type of quality that can be achieved from the treatment. He stated that the process could be altered to meet requirements for discharge and that Table 4 represents

just one sample taken on a specific date. He repeated that most of the tests were performed using standard methods (Standard Methods for the Examination of Water and Wastewater, prepared and published jointly by American Public Health Association, American Water Works Association, Water Pollution Control Federation). He said that only certain parameters were included in the Table and that it was not the entire amount of information. The difference in the results shown in Table 3, (which indicated averages of results obtained from analyses of samples from the bio-aerobic treatment (BAT) system) and the results from the facultative pond was due to the fact that that the sample from the latter pond was a single sample and was also because there was further treatment occurring in the latter pond.

The additional treatment in the facultative pond is due to the aerobic decomposition in the aerobic zone and anaerobic decomposition in the anaerobic zone.

He explained how he would, when sampling from the facultative pond, collect three samples from each of twelve sampling points by means of a boat. Samples would be collected every four hours while the pond was being discharged.

Dr. Malinowski made reference to the fact that the United States E.P.A. had claimed that the new Niagara Falls, New York sewage treatment plant was the most

sophisticated waste water treatment plant in the United States. During the questioning, he stated that its receiving tanks were made of unlined concrete which, he estimated, was in the order of a foot thick. Since these concrete walls were unlined, Mr. Cline raised the question as to whether or not it was reasonable to conclude that E.P.A. considered the concrete basin to be a superior system to the liner system. Dr. Malinowski did not agree.

When he was asked to discuss the proposed discharge point, Dr. Malinowski stated that the material will be discharged from the facultative pond on a batch basis under the following conditions:

- 1) the quality of the water must receive Ministry approval;
- 2) the flow rate of Nanticoke Creek must reach or exceed fifteen cubic feet per second;
- 3) a mixing ratio of 100 to 1 must be maintained; and
- 4) certain weather conditions must exist.

The required weather conditions are that no ice cover exist on the creek, that air temperature is higher than zero degree Celsius and that discharge will occur only during daylight hours.

In response to a question from Mr. Morton, Dr. Malinowski stated that the solids are removed carefully from the lagoons to avoid damaging the liners so that the

clay underneath is not contaminated. He said that it would be difficult to remove the sludge while a lagoon was being operated but in that case, they would use some kind of suction from a six-inch pump or other equipment. If the clay underneath had been contaminated, it would be removed and virgin clay would be used to repack the bottom of the lagoons. He said that the plan was to replace the liners approximately every five years. Portions would be examined and tested but the rest of the liner would be disposed of in the landfill.

Mr. D. L. Colborne, Eastern Canadian Manager, Staff Industries Canada was also called as a witness for the Applicant. His company is involved in the fabrication of plastic materials to be used as impermeable barriers for the containment of liquids and solids. Mr. Colborne stated that the liner being considered for this proposal would be made from a material called chlorinated polyethylene (CPE) and would have a thickness of thirty-thousandths of an inch (30 mil). He produced exhibits with information on installations where this type of liner was used, how it is fabricated into a liner and how it is installed.

He said that liners of this material were installed at Chem-Trol by his company in 1970-1971 and that his company had not been informed of any complaints regarding breaks, leaks or other problems.

He felt that a liner installed in a lagoon and weighted down with water or chemicals would not create any problem as far as weaknesses are concerned. He agreed that his firm had failures in installations of a similar type but they had been rectified and are now satisfactory. He stated that, in his opinion, it was logical to use this kind of liner, bearing in mind that it was going to be used in lagoons to hold industrial chemical waste.

Mr. Colborne, when questioned with respect to the liners that would be used in the lagoons, stated that the same compound formulation, as that used for the liners at the Chem-Trol installation at Model City, New York State, would be used for Nanticoke Waste Management Limited and the liner would not be customized for this project.

He said that the manufacturers of the liner material would provide panels of the material which his company would then join to make larger panels with a solvent-based adhesive. He agreed that the greatest danger of failure is not with the impermeable material itself but rather with the joins in the panel. When questioned whether a simple weld as used in West Germany which made the join homogeneous with the material was not better than a solvent joined weld, he said that it would still be a weld. He felt that a 100-mil liner would be too rigid and brittle but he agreed that the 100-mil liner

would not break if bent through 180 degrees. He said the 30-mil liner would provide the service that is required of it and agreed with the statement that there are no other liners which are generally reputed to be a better liner than the type which would be used at this installation.

Mr. Colborne said that it is more advisable to place the liner on the proposed two feet of compacted clay than on sand, as long as there were no projections, but that it can be placed on sand successfully. Although he didn't have any personal experience with liners in lagoons that were agitated or aerated, he said that he was not aware that any problems had been encountered with liners similar to those provided by his company. He said Hypalon liners had been used at Chem-Trol but that the type of liner had been changed because of better chemical resistance experienced with chlorinated polyethylene. He agreed that, should the liner bubble because of the water table in the soil surrounding the lagoon, the water table would have to be higher than the level of the wastes in the lagoon. Bubbling has occurred in various projects but it is generally found to be created by gas.

Mr. Colborne indicated that the liner for the facultative pond (which is 110 feet by 400 feet) would be fabricated by his company in two panels 400 feet long by 55 feet at his factory. The final seam would be joined at

the site using the solvent based adhesive. Although spot checks are done on seams for peeling, stress and leakage, these tests are not done on every seam. He agreed that there may be occasions when a chemical will get into the system, which wasn't envisaged in the design of either the liner and/or the sealer, and that this could nullify the sealer.

He said that the liner in the facultative pond would be anchored by burying it about two feet deep and three feet back from the edge at the top of the berms and at the bottom of the lagoons with sandbags. He stated that a high water table could impose some stress on the material but since the material has a tensile strength of 1700 pounds per square inch, the stress would have to be extreme to break it. He considered this unlikely. In the lagoons the liners are installed, in all cases, in as relaxed a condition as possible to minimize any tension on the material.

Mr. Cline quoted from a report entitled, 'Liners for Land Disposal Sites', published by the Environmental Protection Agency in 1975 which stated, "the basic material (chlorinated polyethylene) has little resistance to chemicals, acids and caustics" and commented that he was concerned because of its proposed use in the company's installation. Mr. Colborne declined to comment on Mr. Cline's reference but referred to a test which he called

the best and the longest one which was conducted in New York State. He said that the results should be available within the next two or three weeks.

Mr. Colborne felt that the compacted clay would be sufficient to deter burrowing animals from damaging the liner. He also stated, in response to a question from Mrs. Thompson, that the seams are exposed to chemicals in tests for various times--7, 14 days or even longer--to determine their resistance to attack.

Following the presentation made by Mr. E. Turner regarding the need for industrial waste treatment facilities (to which reference is made earlier in this Report), and the information which he provided regarding the various alternatives, Mr. Turner was cross-examined by the various counsel on his evidence and questioned, as well, on some of the information presented by the Applicant's witnesses.

He agreed that it would be easier for the Ministry to police a central location rather than fifty or sixty small individual disposal plants. With respect to the fixation process, which he mentioned earlier as a possible alternative treatment, he said that it was his opinion that it could not be applied to all types of industrial wastes and that was the reason for the demonstration plant in Hamilton.

Regarding his information on the Chem-Trol plant and its effluent quality, Mr. Turner stated that he had discussed that company's effluent with local New York State representatives and had generally received a favourable response in the sense that the effluent was believed to be of good quality and that it was his understanding that the E.P.A. had issued a permit to Chem-Trol to discharge the effluent to the Niagara River. Subsequent evidence given at the hearing indicated, however, that the discharge permit had been denied. Mr. Turner indicated that he was not aware of that fact.

The questions directed to Mr. Turner ranged over many subjects, such as the economics of treatment, the number of people that would be affected, the method of discharge, the aesthetics of the site, and the like. He mentioned, for example, that, in case of a flood situation, the whole site would be suitably bermed. Water inside would be contained and that outside would be kept out. In answer to a question from the audience, Mr. Turner clarified that the intention of the Ministry was not to have someone located at the discharge pipe during the entire time that the discharge was occurring; rather there would be reliance on the integrity of the company. He repeated that the contents of the lagoon would be analyzed by the Ministry and approved for discharge and the company would be expected to operate under conditions

which were imposed on them for such a discharge. There would certainly be Ministry people there, he said, but not all the time.

Mr. Turner was also asked whether there should be more than one liner used in the lagoons. He agreed that more liners in layers of clay would represent more safety but he thought that it was debatable whether such were necessary.

Mr. Glen Pearce, Chief, Water Resources Section, West Central Region of the Ministry, had provided comments regarding the proposal in a brief to the Board. With regard to the listing of the components in the dissolved solids in the company's waste, he felt that, in addition to what information the company had supplied in its proposal, it would have been better to have the anticipated levels of sulphates, chlorides and nitrates. In that respect, he felt that the report was deficient.

Mr. Pearce agreed, when questioned, that the proposed turnkey system (whereby it would take a key in the possession of the Ministry and one in the possession of the company to unlock the locking device on the discharge pipe) was a reasonable safety precaution. This would assure that the pond could not be discharged until such time as the Ministry approved it for discharge.

Mr. Pearce, when asked to compare the effluent of this facility with the effluent from the Port Dover

sewage treatment plant, stated that he suspected that the Port Dover effluent would have a higher toxicity but, if dissolved solids were considered to be damaging, then the effluent at this facility would be worse. He said that toxic ingredients were also found in surface run-off from farmers' fields, such as pesticides and other chemicals.

In assessing the effect of this facility's discharge, Mr. Pearce agreed that it would be good to have 15 or 20 tables similar to Table 4 in the company's proposal. He stated that it would enable the Ministry to have a statistical evaluation of the variance that might occur in the data--and that this could be significant. However, since this is a batch plant, the importance of knowing the variance is less than if it were a continuous discharge.

He said that the integrity of the Ministry could be relied upon in standing behind its statement as to what it would allow and would not allow to be discharged.

Mr. A. W. McLarty, Regional Biologist, Technical Support Section, West Central Region of the Ministry, was also questioned on his understanding of the data in Table 4 of the Applicant's report on its proposal. (Mr. McLarty had contributed to the Ministry's brief on the Applicant's proposal.) He said that when he prepared his brief for the Board, he believed that the analyses were of one sample. He said that, for a personal assessment of a

system, he would want to know more about it than would be supplied from one day's samples out of 3 or 4 years' operation. He indicated that the one day's data would have very little significance. He stated further that he was concerned about the lack of investigation concerning organic compounds but that he was relying on the statement from Mr. Steve Beszedits, who had also contributed to the Ministry's brief, that the treatment technology was capable of removing these compounds.

All through the questioning, reference was made to the brief which was prepared by the Ministry staff and Mr. McLarty's contribution to it. He agreed that his comments were based only on the reports which were made available to him.

Mr. G. R. Craig, Head, Toxicity Unit, Limnology and Toxicity Section of the Ministry, was questioned about the Applicant's proposal to conduct acute, chronic and bio-accumulation studies on the final effluent prior to discharge. He said the importance of these tests lay in the fact that biological tests can integrate all the effects of the contaminants present and exhibit a certain amount of lethality which individual chemical analyses cannot necessarily predict by themselves. Such tests are used to determine the sum effect of all the contaminants present and their ability to cause the results. As a rule, he said, the testers do not require the chemical

analysis. If, because of toxicity tests, the effluent is unacceptable, that fact would be reported back to the Regional Industrial Abatement officers who, he understood, would discuss the situation with the responsible officials of the company.

Mr. Craig did not know whether these tests would be carried out prior to every discharge of effluent but he did not see why they could not be carried out then. He thought that a properly equipped, ready to operate laboratory would be able to conduct all these tests in two weeks. He said that, although the Ministry may not be involved in the testing, it reviews the procedures before the testing commences and also reviews the results. There are certain inherent controls in the testing procedures which ensure the acceptability of the test. It was his understanding that nothing else would be added to the pond after the test had been made.

Mr. S. Beszedits, Approvals Engineer, Environmental Approvals Branch of the Ministry, stated that, from his look at the unit operations which are incorporated into the treatment sequence of the proposal and given the expected waste characteristics, he did not think that there would be any problems for the company to meet the effluent criteria of the Ministry.

Mr. Beszedits stated that the original proposal of the company supplied to the Ministry was a very

simplified basic fundamental description of what the company was proposing to do. He said that there was no real hard engineering data in it.

In Mr. Beszedits' portion of the Ministry's brief, he referred to the ammonia being stripped from the waste by raising the pH and providing aeration. He stated, when questioned about ammonia stripping, that he had based his comments on information gained from the literature and that he had no personal familiarity with ammonia stripping facilities or their operation. He said that some form of aeration would be necessary for stripping.

With reference to the number of samples collected and the resulting data, as shown in Table 4 of the company's report, he said that the Ministry would be in a better position to look at variations and differences if there had been twenty or thirty samples collected and analysed. Mr. Beszedits stated that he had no direct practical experience with lagoons and liners or the chemical reaction of various chemicals on various liners. He said that the Ministry would need a lot of further information on the biological treatment system, the carbon adsorption system, and all the other unit operations which would go into the particular system, before it felt that the design of the facility could be completed. He said that no hard design detailed calculations or concepts had

been presented to the Ministry at that time and that these would be necessary in progressing with the approvals.

Mr. S. Bell, Senior Approvals Engineer, Environmental Approvals Branch of the Ministry, explained the process used by his section to handle applications. He said that he co-ordinated the work of members of the Ministry in its evaluation of each aspect of the proposal. When he is satisfied with the answers in the proposal, he recommends to Mr. D. Caplice, Director of the Branch, whether or not the proposal is ready for a hearing and the decision is then up to Mr. Caplice. After the public hearing, based on the recommendations of the Board, a decision is made whether or not to grant an approval. Before the Certificate of Approval is granted, the Branch will require further details of the actual project.

Mr. Bell, when questioned, stated that the chemical processes in the application were complicated but, engineering-wise, it could be depicted by a simple flow sheet. He said that the original application had included the use of a deep well for effluent disposal, which, he felt, would have had the least impact on the environment, and on Nanticoke Creek and on Long Point Bay. Referring back to Table 4 of the Applicant's report, he said that these analyses represented three to six months' retention time in the lagoon and not just a grab sample taken on a particular day. He said that he saw the pond

from which the samples were taken and said that it was "probably as clear as water one sees on Manitoulin Island". He said he would like to see a series of samples taken from the ponds at different times, since there have been alleged differences of opinion on that Table 4. He agreed that it would have been better if the Ministry had taken the sample and that the whole project is premised on the assumption that the figures obtained in Table 4 were correct. If he had known that Chem-Trol had only discharged 12,000 gallons, out of 25 million gallons, when he made his recommendation to Mr. Caplice, he probably would have asked for more analyses, and more sampling of the effluent. He had not seen any sampling of the effluent by any other party.

Mr. Bell said that the effluent would have to go through further treatment if it did not meet the Ministry's standards as far as discharge was concerned. If it cannot then meet the standards, the Applicant would have to cease operations, in which case the effluent would have to be trucked or taken to a large body of water where it could be mixed and safely discharged.

Mr. Borkovich asked Mr. Bell certain questions concerning the completion of the application form, who had altered the information on the form, and who was to be the owner or operator of the facility. Mr. Bell answered that the owner and operator of the site would be Nanticoke

Waste Management Limited and that alterations had been made on the form by the Ministry on the basis of information which it had received. Mr. Bell agreed that the Ministry did not have all the details on the capacity and operation of the individual components comprising the treatment facility, nor other information as required on the application form. He remarked that there is, however, nothing in The Ontario Water Resources Act which indicates how much information should be available. He felt that the Board would ask the Ministry for more information if it required it and that, therefore, the application was complete insofar as the Ministry was concerned.

Dr. O. Meresz, Manager, Organic Trace Contaminant Section, of the Laboratory Branch of the Ministry had provided further input to the Ministry's brief concerning this proposal. He said that, in his opinion, the evidence previously given that the recipients would know the constituents of the waste received at the plant was only partly true, since not even the producers of the waste knew the exact components of their industrial waste. He felt that the most important information was what was going out in the Creek and what was going to be discharged. He did agree, however, that the more testing which is done of the waste coming into the facility, the less chances there would be of problems occurring. In this respect, he said that the Ministry

would be undertaking analyses before the effluent is discharged and that its laboratory is equipped to ensure that any effluent discharged would be within safe limits. He agreed, when questioned, that the effluent from this facility would not improve the water quality in Nanticoke Creek or the groundwater and that the Creek water would be better off without the effluent.

He said that if one wants the safest effluent possible, then the individual metals in solution would have to be analyzed quantitatively. In his opinion, the metals for which tests should be undertaken would be beryllium, cadmium, chromium, cobalt, copper, iron, lead, mercury, nickel, selenium, tin, zinc and arsenic. He felt that when the samples were taken, it must be ensured that the lagoon contents are homogeneous so that samples taken for analysis are representative of total lagoon contents. Dr. Meresz said that his recommendation for additional tests to be conducted on the effluent would be for total organic solids content and those using gas chromatography and mass spectroscopy scanner. He felt that these tests would be of utmost importance. The person making the decision to allow the discharge must base his decision on information given to him by the laboratory and that obtained by the biological monitoring.

Dr. Meresz said that he would be concerned about chlorinated aromatic compounds in the waste because they

would be taken up by living organisms and stored in the fats. They could contaminate milk and get into the food chain. He said that, for humans, this could result in a general deterioration of health and poisoning, depending on the quantity a person was exposed to, and that dairy herds could also be affected if they drank the water or ate grass which had been flooded by the contaminant or leachate.

He estimated that sixty to eighty per cent of the organic wastes would be destroyed or removed by carbon adsorption.

With regard to the change in the concentration in the final pond between the time of sampling and the time of discharge, Dr. Meresz felt that, due to the precipitation in previous stages, the remaining concentrations are so low that he would not expect further precipitation and changes in concentration unless there is a chemical intervention such as change in pH or acidity of the pond.

Mr. John Vogt, Industrial Abatement Section, West Central Region of the Ministry, answered questions regarding his review of the company's proposal. He said that he and staff would maintain surveillance by inspections at the site to ensure that the proper testing was being carried out, to provide adequate assessment of the treatment facility and to check any monitoring

facilities that are installed for the detection of leakages into the ground water. He and his group would also be involved in taking samples from the final lagoon, prior to discharge, for analyses by the Ministry laboratories. If everything seemed to be operating properly, he expected that they would do spot checking on an average of possibly once a week; if there were some doubts they would check more frequently. During discharge there would be spot inspections two or three times a week to check the records of the company and to ensure that the discharge was being carried out properly. If there was a spill of material on the site, they would make sure that it was cleaned up properly. He said that these checks would be made without advance notice to the company. During discharge he said, the company has proposed to measure the flow hourly and make any adjustments to the discharge rate in order to ensure that the hundred-to-one dilution is maintained.

After Mr. Vogt, Mr. G. Pearce provided further evidence on behalf of Dr. M. Palmer, Head, Lake Systems Unit, Water Resources Branch of the Ministry. (Dr. Palmer was unable to be present at this hearing.) He also felt that, with the batch process and the monitoring provided by the Ministry and the company, and the insistence upon the proposed criteria being met, a person would be relatively safer, insofar as this plant was concerned, with respect to toxic materials than with a secondary sewage treatment plant serving a significantly-

sized municipality. He did agree, however, that, with the continual recycling of the leachate from the landfill operation, there could be some risk of build-up of trace elements or trace particles of contaminants in the final pond and that the data of Table 4 could eventually be exceeded.

Mr. L. S. Love, President of L. S. Love and Associates Limited provided comments and evidence regarding the assessment which he had made of the proposal for the Regional Municipality of Haldimand-Norfolk. He said that, because so much evidence had been given which had a relation to the Chem-Trol operation in New York State, he had visited that installation, had taken samples from some of its ponds and had talked to local municipal officials. He said that Chem-Trol had approximately 25 million gallons of waste which it was not being allowed to discharge because it did not meet the discharge criteria. He said he took samples of two of the ponds, the East Facultative pond, which contains approximately 20-25 million gallons of waste that he said had had three years of treatment in the pond, and the Facultative Pond No. 3 in which the waste had been accumulating for some seven months. The sampling ponds were later clarified as being from Facultative Pond No. 3 - Final treated waste waters, and East Facultative Pond - treatment of carbon treated waste waters in progress for approximately

six months. The samples were shared with Chem-Trol and then analyzed by Mr. Love's laboratory (or one employed by him) for the same parameters as are shown in Table 4 of the Company's report. He had prepared a Data Comparison Table which contained four sets of data from four samples. One set was from Table 4, one set of sample analyses obtained from the New York State Health Department and the two sets of analyses of samples which he had taken. He compared the four analyses and said that they indicated that the latter part of the system was not working. The ammonia was not being oxidized and that it would be in the discharge and also that some long chain refractory hydrocarbons were getting into the Facultative Pond. He said that the discrepancy in the analyses of the four samples placed some doubt on the figures in Table 4 which he considered was the most important piece of information on the whole proposal. He did agree later that the four sets of data were from samples which had been collected from different ponds and thus could not be compared. He said that he was trying to get a feel for the analyses of various ponds which were ready for discharge. It was his opinion that the Board was left with a minimum amount of data on which to make a decision.

He said that he was particularly concerned about ammonia because, in his company's pilot plant work, staff found that the ammonia stripping facility either had not

worked, or had not worked continuously, with the result that they were getting slugs of ammonia that were killing off the bacteria and they had to start over. Because of this problem and the concept in the proposal, he checked the concept out with Mr. D. Greey, President of Greey Mixing Equipment Ltd. According to Mr. Love, Mr. Greey had said that the concept was completely impractical. Mr. Love gave a long point-by-point rationale on the various weaknesses, as he saw them, of the proposal and the processes on which it was relying. These included, in addition to probable ammonia removal problems, sketchy engineering, questionable neutralization and centrifuge separation, too much dependence on method of carbonaceous BOD removal, too high removal efficiency expected of aerated lagoons, too high BOD value of waste going to facultative pond, impracticable plans for aerator capacity, poor design of chemical reaction vessels, and inaccurate analytical results of the final pond. He said that this technology would be correct if the discharge were to a sewage system.

During the cross-questioning of Mr. Love, it was pointed out to him that the reason that Chem-Trol had not been permitted to discharge was not because its waste was not acceptable for discharge but rather because of a lack of information, since Chem-Trol had not carried out the testing. It was also pointed out that the chronic fish test takes 60 to 90 days which could have been the cause of the lack of information.

Because of his comments on the weaknesses of the proposal, Mr. Love was told that if it was found that the results of a process were not as desired, the waste could be pumped straight back into the line and started over again. Similarly, there are quality control points where the results of the treatment can be checked and if the waste treatment is not acceptable, the waste would be recycled.

During the questioning, some of the figures that Mr. Love supplied regarding his firm's analyses were corrected by him with regard to "rounding-off" of the figures and units quoted. He did not agree with the explanation that a 25-30 horsepower aerator would be sufficient because it was only aerating a corner of the lagoon; therefore, only that size of aerator was needed. He said he would need to see some data on the ammonia levels before and after the aerated lagoon treatment before he would agree with that explanation.

Dr. Jon Sykes, Assistant Professor, Water Resources, Department of Civil Engineering, University of Waterloo, was a witness for the Haldimand-Norfolk Pollution Control Committee. He stated that a lot of the elements of the treatment facility were quite good, in his opinion, but that there were a few of the processes that were questionable. His first example was the information available on what would happen in the facultative pond. The proposal does not show the suspended solids loading,

but the suspended solids concentration in that pond according to a document entitled, "Analytical Results Received from New York State Department of Environmental Conservation" was at 83 milligrams per litre (mg/l) which was much higher than the 15 mg/l that was permitted by the Ministry for discharge. It was his opinion that the suspended solids could have gathered a lot of the heavy metals and, therefore, the suspended solids should have been analyzed. If these suspended solids are discharged and then settle out in the creek, they could be washed into the flood plain during periods of flood. He also felt that the ponds should have been divided into smaller surface area ponds from a maintenance point of view and to lessen the effect of the wind stirring up the pond and altering the suspended solids loadings from that which were reported. He also felt that more information would be required regarding the influence of the seasons on the efficiency of treatment. Also, since the carbon adsorption columns are not 100 per cent efficient, there was the potential for materials like PCB's and Mirex passing through the systems into the facultative ponds. He said that better than 99.9 per cent removal is needed for PCB's but agreed that, with recycling and a proper control point, the PCB's could be reduced to a level approaching zero. Dr. Sykes felt that it was important to know what fluctuations might be experienced in the operation of these facilities and the effect on the

effluent; that is, it was important to know what to expect on the best days and the worst days. He said that it would be difficult to assess the effect of the effluent on the Nanticoke Creek over the seasons due to the lack of data.

Dr. Sykes said that there shouldn't be any problem in designing the facilities large enough to treat the flow but the size might be governed by the volume which the Creek could accept at the dilution rates set. However, he agreed that if the infiltrates into about 75 acres of landfill site were pumped through the treatment system it could amount to approximately 25 million gallons per year--equal to the proposed treatment system itself, which would necessitate doubling the area of the ponds. The concentration of wastes in this volume of liquid would not necessarily be the same as that going into the proposed treatment.

It was his opinion that the discharge volumes being proposed were approaching the upper limits for using Nanticoke Creek. He didn't think that there was much argument that the company's discharge policy may have to be altered or that they may have to reduce the amount of waste that can be discharged.

During the questioning, Dr. Sykes agreed that the runoff from agricultural uses is much higher in pesticides than would be the effluent from this facility and that one would need extensive analysis of the

facultative pond before a person could say that its contents were environmentally hazardous.

Mr. C. Schultz, Public Works Superintendent, Town of Lewiston, New York State was called to give evidence on behalf of the Regional Municipality of Haldimand-Norfolk. With the aid of photographs, he explained the location of the Chem-Trol site with respect to the Town of Lewiston and a list of the complaints which have been laid against the operation of Chem-Trol, of which he had official knowledge. These complaints concerned such matters as killed vegetation on property adjacent to the Chem-Trol plant, the unauthorized use of a 30-inch outfall line into the Niagara River, numerous reports of leakages, complaints regarding odours, explosions, and a chemical spill resulting in a blue colour appearing in 4-Mile Creek. He stated that some improvements were noticed but some abuses still continued. He showed one photograph of a lagoon in which the liner had gas pockets underneath, causing it to bulge noticeably. He said that he had been present when the liner was floating on the top with the gas bubbles under it but that, since then, a pipe had been put under the lagoons which allows the gas to escape.

He acknowledged, when it was brought to his attention, that the management of Chem-Trol had changed after it was acquired by S.C.A. in 1975 and, although certain improvements had occurred, abuses still took place.

In answer to the comments of Mr. S. Love and the complaints voiced by Mr. Schultz, Mr. R. Rakoczynski, plant manager at Chem-Trol, gave evidence for the Applicant. He clarified that the samples taken by Mr. Love from Chem-Trol were from the east facultative pond whose contents had been there somewhere between 6 to 8 months and from Number 3 facultative pond whose contents had been treated for 3 years. According to Mr. Rakoczynski, the analytical results for the samples taken by Mr. Love indicated that the treatment periods for the ponds had been transposed by Mr. Love. He stated that the analytical results of Chem-Trol's portion of Mr. Love's samples were not yet available.

Mr. Rakoczynski provided explanations for the complaints of Mr. Schultz. He said that the blue chemical had come from a salts area whose berm had been eroded away, due to combined ice and water action. Since that occurrence, steps had been taken to control the problem. He said that, in spite of the abnormal weather conditions, they had not had any spills from any of their waste water ponds. With respect to odours, he said that surface aerators had been obtained and installed and that these have served to correct the problem.

When asked whether he considered that facultative pond number 3 was ready for discharge, he stated that Chem-Trol was conducting a biological testing program to determine acute, chronic and bio-accumulation toxicity on that pond and, based on the results, the

decision would be made whether or not it could be discharged. He said that the reasons for no more than 12,000 gallons (out of 32 million gallons) having been discharged was that they had not established an economically feasible means of transporting the waste to the Niagara River and also because they did not have the results of their bio-testing programme. He said that a research and development group was investigating different options such as evaporation, spray irrigation and incineration if they do not solve the problem of discharge to the Niagara River.

Mr. Rokoczynski added that some rips have occurred in the liners near the upper surface of the lagoons which were caused by an ice layer and fluctuating waste water levels. The monitoring wells on the property are checked on a monthly basis along with 60-odd surface water sampling stations dispersed throughout the plant site. He said that they monitor different parameters in the facultative pond over different time frames. The biological monitoring program is the final conclusive study to confirm the analytical data. It was his opinion that, instead of recycling wastes, it would be better to install a temporary carbon adsorption unit rather than tie up operating time in the system. He stated that costs did not enter into the decision whether a waste goes into the landfill or through the waste water treatment system but that it was based on the physical state and chemical characteristics of the waste.

LANDFILLING

(1) The Applicant's Proposal

As indicated early in the Hearing, the establishment of a landfill site for the disposal of industrial wastes, which are, at present, not recoverable, is an integral part of the overall industrial waste treatment facility proposed in these two Applications. As will be emphasized later in this section of the Report, the landfill site and the waste water treatment operation are quite interdependent. The proposed landfill site is referred to as a "secured" landfill--that is, it has a management system associated with it for the handling of leachate, whereby all contaminants are maintained in a given area and are prevented from getting out into the environment beyond the actual landfill site.

In describing the landfill operation in detail, Mr. Drew pointed out that, from an environmental standpoint, a centralized facility such as this, rather than a proliferation of such installations across the Province, offered obvious advantages. Under the best of conditions, the effective handling of industrial wastes generated by society--many of which are hazardous to man and to the environment generally--poses a serious problem. In such a treatment facility as that proposed, firm controls are exercised over all aspects of the operation, with constant and continuing

monitoring, so that the greatest possible protection of the environment may be maintained.

Mr. Drew stated that this particular site was chosen because its characteristics appeared to be ideal for such purposes. The site (the Riley Farm), one of 14 sites viewed, is virtually flat, with heavy impermeable clay for a depth of some 30 feet over the bedrock. The landfill would provide a scientifically-controlled, environmentally-acceptable site for the disposal of wastes which require isolation from the environment. Basically, the concept of secured landfilling involves the maintaining of contaminant insolubility. This is accomplished by constructing synthetically-lined cells into which industrial materials can be placed and where their physical and chemical environments can be controlled.

Evidence brought forth by witnesses for the Applicant indicated that the wastes will consist, for the most part, of materials not presently recoverable, including, for example, industrial residues and sludges which do not have any value at the present time under present technology. These materials will be located in carefully catalogued areas, not only for the purpose of localizing the source of any contamination which might arise and which would have to be corrected, but to facilitate the recovery of such materials, at some

future date, should technology develop to the point where such recovery could become a viable undertaking. The landfill will be constructed in such a way as to afford protection against the contamination of ground and surface water. It will provide total containment of landfill materials. As leachate forms and collects above the liner, the leachate will be pumped out and disposed of in the waste water treatment facility.

The proposed system involves the excavation of a series of cells to a depth of some 15 feet and the installation, within each cell, of a synthetic liner over which a cover of two feet of clay will be placed for liner protection and attenuation purposes. The liner will be made of 30 mil. chlorinated polyethylene, of 1600-1700 pounds per square inch tensile strength, and it will be resistant to acid and alkalines alike. Underneath the secured landfill, lysimeters will be installed which will allow the sampling of any leachate which may form. (The leachate will result mainly from the infiltration of rain water.) Lysimeters will also be placed around the periphery of the site at intervals of approximately 50 feet. (Lysimeters were described as small sampling devices, which are capable, by a suction action, of drawing water out of the clay into a small sampling pipe. Such devices can be used to monitor contaminants moving through unsaturated zones--as

opposed to sampling wells which operate in saturated zones.) The wastes will be contained, for the most part, in 45-gallon drums which will be stacked in layers in the landfill. The drums will be examined before going into the landfill and will not be accepted if they are found to be leaking or damaged. Over each layer of drums will be placed a layer of clay.

It was pointed out that the drum containers are basically for material-handling purposes (i.e., to enable the safe handling of material in transit from the waste generating site to the waste disposal site). They are not intended to contain the wastes for an infinite period of time; at some point, they will disintegrate. The liner, therefore, has to be chosen with this eventuality in mind.

The drums will be covered daily. Before each drum is put in place, a three-dimensional grid inventory will be made, showing the level, section and cross-reference, so that the exact location of each drum of specific material is known. Each cell, when filled, will be covered with an impervious layer of clay.

The major portion of the material to be disposed of in the landfill will be of a semi-solid nature. Solid waste materials will be placed in the landfill both in drums and in bulk. Anything which

possess a flow point will be placed in a drum rather than being deposited in bulk. Certain chemical mechanisms will be used to preserve the immobility of these chemical constituents in the landfill.

Different types of waste covers will be employed, including clays and other soils, and fly ash (where some acidity is required in the landfill), and carbonates, phosphates and other hydroxides, such as lime, (where the end objective is in maintaining the insolubility of the components placed in the landfill.) Sludges containing salts, obtained from the water treatment facility, will also be used, in that such salts have an affinity for certain metals and liquors which may be released in the landfill site. Activated carbon may be used as cover in certain areas where control of organic vapours is necessary.

Individual areas will be established within the secured landfill, where certain wastes will be completely isolated from other wastes, in order to prevent one type of waste reacting with another. For example, certain types of wastes, when brought into contact with another type, may result in an explosion. Some materials, such as heavy metal sludges, remain in an insoluble form when placed in an acidic environment, but become soluble if these acidic conditions do not prevail. Other materials which, in themselves, may be quite inert and immobile, may, when mixed, become

mobilized and soluble, and hence generate a leachate problem. For these reasons, careful separation of such materials must be maintained. At the same time, it was pointed out that it is desirable, in some instances, for one type of material to be combined with another in the landfill, because of the beneficial results which may arise from the reaction of one such material upon another. Evidence indicated that there will also be at least four separate cell areas reserved for the particular isolation of certain types of waste materials. For example, heavy metal sludges, such as mercury, copper, cadmium, etc., will be placed in specific areas of the landfill, segregated by large earthen berms from wastes in other sections.

It was made clear at the hearing that certain substances, such as pyrophorics and chlorophorics, radioactive materials, explosives, etc., will not be accepted into the landfill at all. In every instance, before the shipment of any material whatsoever enters the plant, the material will be checked and samples taken to the laboratory for analysis. Approval would then have to be issued before the material could be unloaded.

No wastes or waste mixtures will be placed in the landfill which could chemically penetrate the liner or the clay area. Chemical tests will be performed to make sure that such materials as solvents, for example,

are not placed in the landfill as these can cause the liner to degrade. Similarly, no waste combinations will be placed in the landfill which would produce gases which may be considered as being unnatural to the environment (e.g. sulphur dioxide or hydrogen sulphide).

Further general details concerning the landfill and the method of operation were provided as well. Both the lagoons and the landfill area will be fenced and supervised by 24-hour security patrols. All gates will be locked when the plant is not receiving material. The landfill will be completely surrounded by a retaining berm (utilizing the clay excavated from the cells) in order to prevent natural drainage runoff from the site gaining access to Nanticoke Creek. Approximately 37 acres of the site will be used for landfilling. (The peripheral greenbelt area will consist of 13 to 14 acres as well.) Each landfill cell will have its own lysimeter and will be individually monitored. In addition, vertical wells (standpipes) will be constructed and maintained in each cell throughout the site. These will extend some 3 feet through the top of the landfill; they will be 24 inches in diameter and will be constructed of precast concrete. Each standpipe, which, in effect, becomes a leachate collection sump, will rest upon a concrete pad on the bottom of the landfill in order to prevent

puncturing of the plastic liner beneath the clay. If a leak should occur in a cell, the cell will be pumped out, the material excavated, the precise location of the leak determined and a repair effected, before the leaked material gains access to the watertable. The pumped-out material will be carefully analyzed, given pre-treatment if necessary, and will then be put through the waste water treatment facility.

While the waste water treatment facility can conceivably continue to operate indefinitely, at some point in time the capacity of the landfill facility will be exhausted at this site and the landfill will, therefore, have to be moved elsewhere. When the landfill has been closed, it will be carefully sealed with a compacted cap of clay, a minimum of 6 inches of topsoil placed on top of the cap, and the site will be seeded, and landscaped. It will eventually be used for such purposes as pasture or for community activity, such as parkland. The vertical standpipes will provide a perpetual means of monitoring the site and will also be the means of removing any leachate which may form. (Once the landfill is capped, however, it is not expected that very much water will penetrate the site and that leachate generation will be reduced accordingly.)

As indicated earlier, evidence was brought forth at the Hearing that the waste water treatment

operation and the secured landfill operation are quite interdependent. The waste water treatment operation, in the process of reclaiming water, also produces a waste material. This waste material is, in effect, an industrially-generated sludge, which sometimes contains heavy metals. This material cannot be indiscriminately deposited on land at any landfill, as it is capable of being resolubilized. Hence, the need for them to be disposed of in a "secured" landfill where, through proper management, their threat to the environment is greatly reduced. On the other hand, the landfill cannot exist by itself. Rain water, though in greatly reduced quantities, will, nevertheless, infiltrate the compacted clay cap of the landfill and leachate will eventually be formed. The impermeable liner underneath the landfill will hold it there. This leachate has to be withdrawn, therefore, and treated; hence, the dependency of the secured landfill upon the waste water treatment operation and vice versa.

(2) Evidence Presented For and
Against the Landfill Proposal

Considerable evidence was brought before the Board concerning the landfill proposal by consultants engaged by the Applicant and by staff of the Ministry of the Environment. Further details were brought to

light as a result of cross-examination of those called to give evidence. Mr. L. Bryck of Hydrology Consultants Limited, indicated that his firm had been engaged to do a preliminary study to determine the prevailing subsurface conditions of the site. Three soil test holes were installed to define the overburden stratigraphy and thickness, as well as the permeability of the soil. A downgradient test hole was extended into the bedrock to serve as a piezometer for future water level and water quality monitoring. An evaluation was made of local well data, as well as of the test hole information, to determine the general direction of groundwater movement beneath the site. The test holes indicated a stratified silty clay to a depth of 25-30 feet, underlain by a gravelly, clayey silt till of similar depth, at which point limestone bedrock was intercepted. Mr. Bryck stated that, in digging the test holes, the augers became wet at 20 feet, indicating a groundwater level at that point. He pointed out, however, that water may be present at this location at shallower depths within this silty clay and that the drilling would not necessarily indicate this level because of the lag time for water movement. He, therefore, could not say, with certainty, at what level the water table was to be found. He pointed out, however, that the static level, at the time that the well drilled on the Riley Farm was completed, was

approximately 10 feet below the ground surface. It was Mr. Bryck's conclusion that there is a thick silty clay and till mantle, with very low permeability, overlying the limestone bedrock and that groundwater movement within the bedrock was toward the south (possibly toward Lake Erie rather than toward the nearby watercourses). He added that, in his opinion, the site was a feasible one for the intended purposes of this Application but he felt that additional investigative work of the hydrogeology of the site should have been undertaken in order to define the system more accurately.

Mr. E. Turner of the Ministry of the Environment, in responding to cross-examination, indicated that the basic requirements for a landfill of this type were the existence of a good clay body of material, of reasonable depth, and relatively close to a sizeable body of water. Also essential, of course, was the availability of customers to use the facility. From a technical point of view, he expressed confidence that such a facility as that proposed in this Application, could be operated successfully, given the above conditions, and with adequate controls being placed on its operation. He expressed the opinion, however, that further on-site testing would have to be undertaken, particularly with respect to the groundwater regime, before the site could be recommended for approval.

Under examination by Mrs. L. McCaffrey, Counsel for the Ministry of the Environment, Dr. G. Hughes of the Ministry of the Environment provided the Board with his assessment of the proposal. He conceived of this landfill as, basically, a storage facility for liquid and solid industrial waste, excavated in a clay trench, and with the leachate being pumped out of the trench as it forms. It was his understanding that each trench would be about 240 feet by 140 feet in dimensions and about 15 feet deep. The base of the trench would be excavated in clay of very low permeability (10^{-6} to 10^{-7} cm. per second). Based on information provided by the consultants, he believed the water table to be in the order of 9 feet below ground level--although he acknowledged that there appeared to be some uncertainty about this. He suspected that the groundwater flow was downward, and in view of such a direction, he believed that the water level may be even less than 9 feet.

Dr. Hughes indicated that he had reviewed the landfill proposal originally submitted by the Applicant and that he had certain reservations concerning it. His concerns related, in particular, to the method by which the leachate produced within the landfill could be confined through the use of a liner, and also the monitoring which would be necessary to ensure that the site was functioning the way it was supposed to. He

expressed concern about the function of the proposed liner in the light of the permanent storage which the landfill was expected to provide. He felt that, if the site is supposed to store wastes for hundreds of years, the estimated 20-30 year life of a liner becomes more or less insignificant. Furthermore, he felt that the liner might work against the effectiveness of the monitoring facilities, in that the latter might not provide adequate information on whether the system was working until after the liner had degraded.

Dr. Hughes then proceeded to outline a somewhat different conceptual design which, he believed, would be effective in providing permanent storage for such wastes. He proposed that leachate produced from the wastes be collected in a gravel leachate collection sump installed below the landfill. (Such leachate, he said, could result, for example, from surface water infiltrating through the landfill cover or from water or other liquids being buried with the wastes.) Underneath this sump there would be an area of reworked and compacted clay, overlying a gravel underdrain to collect groundwater. Wells would be placed into the latter underdrain to adjust the groundwater level outside the trench area. In other words, the wastes would be confined within the disposal site hydraulically, by maintaining an hydraulic gradient into the disposal site. The water level in

the landfill would be kept within the gravel leachate collection sump to minimize contact between the water and the wastes. This would be accomplished by pumping the leachate collection well. The groundwater level outside the landfill would be adjusted to a somewhat higher elevation than in the leachate collection sump, by pumping the wells in the gravel underdrain, thereby ensuring that the proper gradient into the trench is maintained. The gravel underdrain would provide a positive monitoring system in that, should the gradient, at any time, become reversed, thereby causing the contaminants to flow outward, they would be detected in the water pumped from this gravel underdrain. Dr. Hughes contended that leakage of contaminants from the site would be virtually impossible as long as the water levels are properly maintained so that there is a gradient into the site. He pointed out, however, that this proposed installation would require permanent maintenance as it is designed for storage rather than for disposal. Leachate must be continually pumped and treated in a leachate treatment facility and groundwater would have to be continually pumped from the ground underdrain in order to maintain the proper gradient.

Dr. Hughes concluded his presentation by pointing out that his design was entirely dependent upon the level of the watertable. The system would not

work if the natural water level was below the base of the site as it would be impossible to confine the leachate hydraulically. (In this connection, some concern was expressed later in the hearing that Dr. Hughes may not have taken groundwater fluctuations adequately into consideration in formulating his proposal.) At some future time, if it was believed that the site was beginning to stabilize, the leachate could be allowed to migrate out of the site by reversing the gradient and allowing it to move through the gravel underdrain and into the underlying clay. It would, of course, have to be monitored very carefully to see if adequate attenuation was being provided. If not, Dr. Hughes stated, the water levels in the trench would have to be reversed again and pumping would have to recommence from the gravel underdrain.

In commenting further on the Applicant's proposal, Dr. Hughes expressed the opinion that more information would have to be obtained on the groundwater flow system. (There was some evidence given to suggest that the limestone may be fractured.) He commented that a contingency plan should also be set up so that appropriate action could be taken in the event that the monitoring wells indicated that the system was not working in the way that was anticipated.

Further hydrogeological evidence was provided by Mr. J. Viirland of the Ministry of the Environment.

Mr. Viirland described the overburden in the area to be in the range of 30 feet, although it varied in places from 25 feet to 60 feet. Well records of the area confirm this range. He stated that the area is underlaid by a limestone dolomite bedrock and that this contains the aquifer from which most of the drilled wells of the area draw water. The water supply is considered to be poor--both with respect to quantity and quality.

It was Mr. Viirland's opinion that the proposed site would be relatively safe for landfilling because of the thickness of the clay overburden. He felt that if any leaking should occur through the plastic liner, the permeability of the clay was such that it would provide adequate time for remedies to be effected. He generally supported Dr. Hughes' viewpoint that the water table was within 10 feet of the surface, basing this on the fact that there are farm ponds in the area and the fact that the static water level in the (piezometer) well (previously referred to as having been constructed to the bedrock) was approximately 10 feet below the surface. He agreed that there appeared to be some difference of opinion among the experts on this matter. He acknowledged that Dr. Hughes' system would only work if the water table was at least this close to the surface.

Reference was made, in cross-examination of

Mr. Viirland, to the fact that no contingency plan appeared to have been set up by the Applicant in the event that the proposed system failed. Mr. Viirland agreed that such a plan was necessary. He indicated, however, that some discussions had taken place within the Ministry concerning the setting up of such a contingency fund as well as the necessity for some arrangement to be made for long-term surveillance and monitoring.

Dr. O. Meresz of the Ministry of the Environment, under cross-examination, indicated that sufficient technology existed to-day to permit the safe disposal of industrial wastes. He added that trace-analytical and biological methodology had been developed to the point that such disposal operations as those proposed by the Applicant could be undertaken properly and would pose minimal risk of harm to human health and the environment. He expressed the viewpoint that, in view of the necessity of disposing of toxic and hazardous industrial wastes, a facility such as this--at this location or at any other location--would improve the quality of water for Ontario but he conceded that the quality of the water in the Nanticoke Creek area would, nevertheless, be better without this facility.

Referring to the landfill operation, in particular, he stated that the method of containment of

solid wastes in the landfill site seemed to be adequate, as proposed. He pointed out, at the same time, that certain organic compounds buried in the landfill (e.g. PCB's) could have a life span of a century or more and that these could continue to leach out into the soil. He expressed confidence, however, that the clay soil would absorb these compounds, for the most part, as they have very low solubility in water. He referred to the importance, nevertheless, of detecting any such organic compounds in the leachate and strongly recommended that additional laboratory testing, to that proposed by the Applicant, should be a necessary part of the monitoring of the operation.

Some additional concerns relating to the landfill were raised during the course of the cross-examination of the Applicant's witnesses. One of these related to the question of who would be responsible for routine inspections and for leachate collection after the landfill was closed. Mr. Kuhn pointed out that it was his understanding that the Ministry of the Environment was giving consideration, at the present time, to this matter. (In her final argument before the Board, Mrs. McCaffrey raised the question of what provisions should be made for continuing maintenance of the facility at some future time when the Applicant was no longer able or willing to carry out this responsibility. She advised the

Board that the Director for the West Central Region of the Ministry had suggested that serious consideration should be given to the creation of a fund, to be administered by the Province or by the Regional Municipality, through the imposition of a tax upon a given unit of waste received for treatment or for disposal. In this connection, he also suggested that a bond be filed to cover the interim period from the time that operations begin at the site to the time that the fund reaches a predetermined level.)

Another concern raised at the hearing related to possible drainage problems which might be created, with respect to properties adjoining the site, following the installation of the berm around the entire facility. Dr. Malinowski indicated that, while he did not foresee any particular problems in this regard, it would, nevertheless, depend upon the topography of the area and that this was something, therefore, which would have to be taken into consideration when the complete hydrogeological survey of the site was undertaken.

Additional concerns on the part of the general public--both with respect to the waste water treatment facility and the landfill--are outlined in a separate chapter later in this Report.

SURFACE WATER ASPECTS

The Applicant's proposal was to discharge treated wastes, under controlled conditions, to Nanticoke Creek. This discharge, which, according to Mr. Kuhn's evidence, would take place eight months out of the year, would only be made under the following conditions:

1. the quality of the treated wastes must receive Ministry approval;
2. the flow rate of Nanticoke Creek must be at least fifteen cubic feet per second;
3. a mixing ratio of 100 to 1 must be maintained, and
4. certain weather conditions must exist.

The required weather conditions were as follows: that no ice cover exist on the Creek, that the air temperature be higher than zero degrees Celsius, and that the discharge occur only during daylight hours.

According to Dr. Malinowski, there will be recording flow meters on Nanticoke Creek, above and below the point of discharge of the wastes, and several water quality monitoring points on the Creek which will be sampled every four hours during discharge of the wastes. Dr. Malinowski stated that the flow from Nanticoke Creek into Long Point Bay would be away from the Ontario Hydro intake, but he could not say whether

the flow would reach the Jarvis intake, since he didn't know where that intake was. However, many people during the hearing expressed concern regarding the discharge plume from the Creek and its proximity to the Hydro intake, which was scheduled to serve a major population in the future, and also its proximity to the Jarvis intake which was presently being used.

Mr. G. Pearce of the Ministry stated that the flow in Nanticoke Creek had been recorded at various levels (from zero to in excess of 800 cubic feet per second). He said that, based on analyses conducted on the flows over a 9-year period, Ministry staff had concluded that, hypothetically, almost 8 million gallons of effluent could be successfully discharged during the spring and some fall months at a dilution ratio of 100 to 1, when the flow in the stream is greater than 15 cubic feet per second. In the course of the analysis, the Ministry staff had taken all the consecutive dry periods and combined them into one year so that a bias was formed toward unfavourable conditions in the Creek. This served to minimize the period of time during which the discharge could be made.

He stated that the quality of the water in the Creek was relatively low, being turbid and very high in particulate matter. The increase in total

dissolved solids in the Creek, due to the effluent, would be approximately 400-600 ppm, representing a 50 per cent increase over existing conditions.

Mr. Pearce also referred to the fact that the dissolved solids loading in the discharge from this plant would amount to approximately 1.6 million pounds per year, based on the maximum ultimate yearly discharge of approximately 8 million gallons, and he compared this to the present loadings from the existing streams to Long Point Bay, which are 356 million pounds a year, with an additional 50 to 90 million pounds a year from future industrial and municipal development in the Region. The increase in total dissolved solids caused by the proposed project would amount to less than one per cent of what is entering now from the various streams.

With regard to fish life, Mr. Pearce said that there was a good fishery in Long Point Bay and that it was recognized as one of the foremost fish areas in the Province with respect to small mouth bass and perch. It is quite a significant fishery from the point of view of the commercial operations in Lake Erie as a whole. However, he did not expect that the dissolved solid loading from this facility into Long Point Bay, irrespective of mixing patterns, would have a significant impact, provided that organics like Mirex

and PCB's are not associated with the solids in sufficient quantities to cause a problem.

Mr. Pearce stated that the project would likely interfere with cattle watering but, at the same time, he noted that some stream bank erosion was caused by cattle wending their way in and out of streams, and that cattle are also prone to defecate in the stream. Furthermore, he noted that streams are often contaminated by runoff of fertilizers and pesticides due to agricultural activities.

With regard to the criteria which Dr. Malinowski said would be used to determine when the effluent could be discharged, Mr. Pearce said that he would like to add some amendments. He felt that there should be no discharge from June 1st to October 1st because, during that period, the flow could vary too quickly to maintain sufficient dilution for any length of time; there should be no discharge when the stream is ice covered; discharge of the effluent should take place at night as well as during the day in order to drain the lagoon as quickly as possible, and, because of the fact that the effluent would be continuously discharging, there would not have to be any concern about temperatures falling below zero degrees Celsius.

He stated that the Ministry, in examining a discharge from a plant in relation to the receiving

water may use standards which are not necessarily the same for each plant, even though the plants may be similar. Ministry staff would look at the receiving water's size, type, flow and its use. In this case, they would assess the impact on Nanticoke Creek from the standpoint of its various characteristics such as, agricultural use, aesthetics, recreation, use for drinking water, and the effect of the contents of the Creek's plume on the fishery of Long Point Bay and the Jarvis drinking water supply.

With regard to any potential effect on the quality of water at the Jarvis intake, he said that there is justification for requiring that there should not be any discharge of effluent for the next two or three years, or, in other words, as long as the Jarvis intake is in use. He felt that because of the anticipated lower volumes of waste coming into the facility at first, the company could store its effluent until that time period was over.

Mr. Pearce felt that, although the water quality of the Creek would decrease, based on the various parameters, the Creek's usability would not materially change. He said that the important waste components which relate to the fishing industry are those that are toxic, e.g. cadmium; those that are cumulatively toxic, e.g. mercury; and the chlorine

organics. Another important compound was the type which caused tainting of fish flesh, such as solvents, phenols and oils.

Mr. Pearce didn't see any problem in accepting the effluent results as presented in Table 4 of the company's report, since the final decision on the discharge of the effluent will be based on analytical results of the actual effluent ready to be discharged. He felt that the Applicant, in his proposal, had attempted to address the various requirements of the stream, but certain parameters, such as the makeup of the dissolved solids, should, he felt, be addressed further. From that standpoint, he considered the Applicant's proposal was deficient.

Mr. A. McLarty, Regional Biologist of the Ministry, explained why there was concern about the discharge of mercury and cadmium from this facility into Nanticoke Creek. Mercury, he said, was itself relatively insoluble in water but it can be converted by bacteria to water soluble methyl mercury. Through its uptake by the lowest organisms in the aquatic food chain, it gradually builds up in the proteinaceous material of these organisms until relatively large amounts appear in the fish. When humans eat large quantities of these fish, they accumulate excessive mercury in their bodies and their health suffers.

He said that the Ministry is asking the company to be more precise in its measurement of mercury than that indicated in Table 4 because, due to the fact that mercury is cumulative, the company might discharge enough mercury to create a serious problem. However, he said that the actual loading of mercury from this facility, in 8 million gallons, would be approximately 0.04 kilogram--or about a third of an ounce of actual elemental mercury--which the analysts would be hard-pressed to detect.

Mr. McLarty proceeded to explain the concern about cadmium was due to the fact that cadmium would have a direct toxic effect on fish which would either be repelled or possibly killed by it. Again, he said that he was seeking to obtain a more precise measurement of what would be in the company's discharge, although he didn't foresee any problem with the level quoted in the company's proposal. Similarly, he didn't think that nickel concentrations were a matter of concern. At the levels predicted in the discharge, he didn't anticipate any direct toxicity problems in Long Point Bay.

There was also a concern about PCB's, Mr. McLarty stated, since they tended to bio-accumulate in fish as well. He said that there was a lack of information in the company's proposal about pesticides

and polychlorinated hydrocarbons such as PCB's. He added that he was not aware of the list of chemicals and waste commodities which the company proposed to receive at its facility.

In answer to a question regarding the present status of the water quality in Long Point Bay, he said that he understood the quality of the Bay was adequate, in almost all areas, to support the fish species found there and that the Bay was probably more productive than Lake Erie proper. He did expect that there would be, over the long term, some degree of degradation of the entire biological community of the Bay, the fish and perhaps the waterfowl, due to the industrialization of the area, including this proposed project.

In the section which he contributed to the Ministry's brief, Mr. McLarty had concluded that the added safeguards of predischage chemical scrutiny and bio-monitoring and 100 to 1 dilution in the receiving stream, should ensure a very minor impact on Nanticoke Creek and Long Point Bay.

When questioned later about the adequacy of the proposal of the Appliant concerning the effect of the facility on the aquatic life of Nanticoke Creek and the Long Point Bay area, Mr. McLarty said that there were some shortcomings. He mentioned, as an example,

that the current studies of the Nanticoke Environmental Committee concerning the dispersion of the plume from Nanticoke Creek, once it reached the Bay, had apparently been overlooked.

Mr. McLarty was also questioned about bio-accumulation occurring, due to cattle eating plant life in which waste components had accumulated. He said that that would be a terrestrial food chain but that there would not be as much accumulation, since there were not as many intermediary steps.

Mr. G. Craig, Head, Toxicity Unit of the Ministry, said that, if an effluent is found to cause tainting of fish flesh, this information is reported back to the regional officers of the Ministry and to the Ministry of Natural Resources. He didn't know whether the taint in fish flesh ever corrected itself over a period of time; it might be excreted or released by the fish in some way. He said that there are too many other environmental interactions, physical and chemical, which can interfere with the transport of a contaminant, for him to be able to say that a certain amount of contaminant will build up to a certain level in a certain number of fish of a certain individual weight.

When asked whether he could assess the impact on the environment which this facility would have on

the basis of the information available to him, he replied that he could not.

In answer to a request from the Chairman for information on the levels of mercury and PCB's in the fish in Long Point Bay, the Ministry submitted a report entitled, "Chlorinated Hydrocarbon Residues from Selected Sites in Lakes Ontario, Erie and St. Clair, 1975". Mr. Craig indicated that one of the sampling sites included in the report was Port Rowan. He said that spottail shiners collected from the Port Rowan site showed a PCB residue content of 59 parts per billion, which was the lowest reading of eleven sampling points--and lower than the International Joint Commission's recommended body burden levels of 0.1 ppm established for protection of wildlife and the Federal Guideline of 2 ppm for PCB residue concentrations in fish for human consumption. The fish samples from this site, in addition to containing PCB's, contained some amounts of DDT and heptochlor epoxide but the concentrations of these compounds were below the IJC recommended limits. Mr. Craig agreed that, because of the limited range of movement of the spottail shiner, the Port Rowan results did not necessarily bear a relationship to what might be the situation off the Nanticoke area.

Later in the hearing, Counsel for the Ministry quoted from a memorandum from Mr. Craig which

provided 1972 information on contamination of small mouth bass collected in Long Point Bay within 3.5 kilometers of Nanticoke. The information indicated that the PCB's in the bass had exceeded the IJC Water Quality Objectives of 0.1 ppm and that the cadmium concentration had exceeded the U.S. Environmental Protection Agency limits of 0.01 ppm for that metal.

Mr. C. H. Gamble, President, Eastern Lake Erie Trawlers Association, stated that the association was flatly opposed to this waste disposal plant. Among the reasons which he gave was the fact that there were many toxic chemicals being used in Ontario, including mercury, PCB's, and Mirex, which, if they got into the discharge of Nanticoke Creek, would be distributed along a sixty-foot shelf by the five distinct currents flowing in a clockwise fashion in Long Point Bay. At the hearing, he indicated, on a chart of Long Point Bay, the direction of these currents and pointed out other features of the Bay.

Mr. G. Pearce also presented information at the hearing (again on behalf of Dr. M. Palmer of the Ministry) concerning currents in Long Point Bay. He said that the prevailing winds in Long Point Bay ran, more or less, out of the south-west into the north-east for approximately 80 per cent of the time and, therefore, the currents follow this axis as well as

paralleling the shore. He commented, however, that the currents vary widely, depending on meteorological conditions. He said that they had attempted to determine the flow patterns around the Ontario Hydro intake. The purpose was to estimate what the total concentrations would be if the waste plume from Nanticoke Creek combined with what was already at the intake. This was necessary because, for several parameters, the level in the Bay was approaching the acceptable criteria for drinking water and other uses. He said that he felt confident, from the studies which had been conducted, that there was a good degree of accuracy in the prediction of what the concentration would be at the Hydro intake, and that there would be no problem. He said, however, that their assessment had shown a significantly higher risk of a cross-connection between the Jarvis intake with Nanticoke Creek than there was with the Hydro intake. This is the reason he had earlier recommended that there not be any discharge from the plant until the Jarvis intake was out of service. This information has shown that the diluting capability of the Bay is critical with respect to ammonia at the intake, whereas it is not significant in the case of mercury.

He said that they had checked the near shore areas where the fish spawn with respect to the critical parameters, cadmium and mercury, and found that, with

the dilution of the waste, in Nanticoke Creek and Long Point Bay, the levels would be compatible with existing levels in the Bay which had not created any problems.

Mr. Pearce said that the initial plan was to sewer the wastes from the proposed new townsite of Townsend to a temporary lagoon facility which would seasonably discharge to Nanticoke Creek. It would service a population of 7,000 until a plant was built in the Dogs Nest area to serve Port Dover, Simcoe, Jarvis and Hagersville as well, at which time their plants would be phased out. Initially, the Dogs Nest plant would have a capacity of 5 million gallons per day but it was expected that it would eventually reach 25 million gallons or more. The discharge would be west of the Stelco property into Long Point Bay.

The domestic wastes from Stelco, when that plant goes into operation, will go to a temporary lagoon facility constructed in the industrial park, until the Dogs Nest plant is available, at which time the temporary lagoons will be taken out of service. Mr. Pearce believed that the domestic wastes from the Stelco workers was not going to septic tank systems, or to haul-out facilities. He was not sure what plans Texaco had for domestic sewage but he believed that they are going into the sewer the same way. He said that they had a very complete biological treatment plant now and that there was the question of whether to enrich the treatment with domestic waste.

PUBLIC CONCERNS

During the course of the hearings, a number of concerns were brought before the Board by the general public with respect to the Applicant's proposal. These concerns were expressed both in written briefs and in verbal submissions. They came from individual citizens as well as from various organizations. As indicated earlier, the Board appreciates such public participation and gave careful attention to these submissions. A number of these have been summarized below. While the list is by no means all inclusive, it is representative of the kinds of issues which were raised by the public at that time.

Mr. H. Eubank, a farmer and member of the Executive of the Haldimand Federation of Agriculture presented a brief expressing the Federation's strong opposition to the proposed project. He indicated that the Federation had a number of reservations regarding the technical aspects of the proposal--including uncertainty with respect to the quality of the effluent to be discharged into Nanticoke Creek, and the effect of the effluent upon fish, fowl, aquatic life and game, as well as upon the water supply for livestock and for the people of the community; the size of the lagoons; the possibility of odours; the thickness and life of the liner; groundwater levels; the life of the toxic

products to be handled in the facility, and the potential danger to the environment of industrial solids and sludges, pesticides and PCB's. He concluded his brief by stating that the Federation was of the opinion that present-day technology was capable of devising alternative methods of handling industrial wastes to that being proposed, and that such alternatives would thereby eliminate the need to use agricultural lands for these purposes.

Mr. J. Wilkinson, mechanical installation manager for the Kaiser group (the head general contractor at the Stelco industrial site) and a Town Councillor for Dunnville also spoke on behalf of the Haldimand Federation of Agriculture. He indicated that he had some doubts about the impermeabilities of the soils located on the proposed waste disposal site, as well as about the dependability of the liner. Based on experience which he had had with excavations in the general Nanticoke area, he stated that the clay in this region is often desiccated and fissured, with fractures, in some instances, extending 30 feet or more down into the ground. Mrs. McCaffrey pointed out that no evidence had, however, been brought forth at the hearing to indicate that there was any fractured clay at the proposed site. Nevertheless, Mr. Wilkinson expressed the opinion that there was insufficient

information on the permeabilities of the soil on the proposed site to enable a valid judgment to be made on the Applicant's proposal.

A local citizen, Mr. C. Thomson, expressed opposition to the location of the disposal facility on the Riley Farm. He indicated that he hauled drinking water from Port Dover to citizens in the area and the possibility of a spill affecting the water quality of Nanticoke Creek and Lake Erie could pose a serious threat to his business.

Mr. R. MacDonald, President of Elmcrest Associates of Port Dover, expressed opposition to the proposed facility because of the potential pollution effects which it might have on the air and water within the City of Nanticoke.

Another citizen, Mrs. R. Fuller, objected to the proposal on the basis that it was, at best, a short-term method of dealing with the problem of industrial waste disposal. She stated that present-day technology enables us to produce these products and that this same technology must, therefore, be used to find ways to recycle or treat the wastes which result, in a safe, acceptable manner.

A letter from C.N.Rail indicated that, after a review of the Applicant's proposal for an industrial waste treatment facility, and an inspection of the site

adjacent to the C.N.trackage, there did not appear to be any objection on the part of C.N.Rail with respect to its construction or eventual operation.

A letter from the Nanticoke Ratepayers Association indicated opposition to the proposal on the grounds that, in the opinion of that Association, it would endanger the health and well-being of the residents of the City of Nanticoke. Mr. N. Borkovich, solicitor acting on behalf of the Nanticoke Ratepayers Association, also raised several issues in his cross-examination of the Applicant's witnesses during the course of the hearings.

In a brief to the Board, Mr. R. Walker, representing the Norfolk Federation of Agriculture, expressed concern that the proposal will cause the disappearance of food-producing land. He also expressed concern about the operation of this facility in the event of human error, or the accidental spill of hazardous materials. He stated that, since the materials to be processed at this facility are not produced in the area (Stelco and Texaco having indicated that they do not require the services of such a proposed industry), the material should not be processed in this area either. He referred, as well, to the effect on local roads of the heavy industrial tanker truck traffic and the additional hazards

associated with such traffic, particularly in the event of an accident. Concern was also expressed in the brief as to the future of this industry and what would happen when the industry eventually suspends its operation.

A letter addressed to the Board from Mrs. E. Banfield, Recording Secretary, Nanticoke Pastoral Charge, United Church of Canada, expressed the view that effluent from such a waste disposal plant would be detrimental to the health and welfare not only of the residents of Nanticoke but for all those living within the Haldimand-Norfolk region. The letter suggested that reclamation centres for waste materials would be far more profitable and beneficial for all concerned than the type of facility which was being proposed. Similar concerns were expressed in a letter to the Board from the Haldimand West Women's Institute.

A letter directed to the Minister of the Environment by the Eastern Lake Erie Trawlers Association, and subsequently referred to the attention of the Board, expressed strong opposition to the proposed facility. Referring to the waters of Long Point Bay as being in excellent condition at the present time, and the fish produced from these waters by anglers and commercial fishermen also being of prime quality, the letter stated that insufficient research

had been undertaken of this proposed industrial waste treatment site to provide safeguards for the protection of both this industry and this body of water. Later in the hearings, the Board was addressed by the President of this Association, Mr. Gamble. He again emphasized the concern of the Association about the effect which the proposed effluent from the plant might have upon the fishing in Lake Erie. He described the currents in Long Point Bay and expressed the opinion that these would carry any toxic materials contained in the effluent throughout the entire Long Point Bay area.

Similar concerns about the possible effect of the project on Long Point Bay were expressed by Mrs. C. Thompson. She referred to the unpredictable nature of the Bay, from a meteorological point of view, and the low flows which frequently occur in Nanticoke Creek.

Mrs. E. Huxley, in addressing the Board on behalf of the Port Dover Board of Trade, expressed opposition to the proposal on the basis that Port Dover, City of Nanticoke, has a large and viable commercial fishing operation as well and that it is a tourist and lake-oriented community. She expressed the opinion that the Applicant's proposal posed a threat to the quality of the lake water and the community's water supply.

Another citizen expressed concern about the

amount of nitrates which would be discharged to the Creek in the effluent from this proposed plant, particularly in view of the fact that the large Lake Erie water intake pipe is located near the mouth of the Creek. Mr. Stadelmaier replied that, while nitrates would be present in the waste materials being processed in the plant, only a very small quantity (in the order of 20-30 ppm maximum) would be discharged in the effluent and that they would be within drinking water standards. Concern that the Nanticoke Creek outlet is only a short distance from the afore-mentioned water intake was voiced as well by the members of the Hickory Beach Cottager's Association in a brief to the Board.

Mr. J. Vanderkooy, President of the Haldimand-Norfolk Christian Farmers Association also presented a brief to the Board. He pointed out that, as citizens of an industrialized country, we must all be prepared to meet some of the consequences of this industrialization, and that the responsibility of disposing of industrial waste is the price we must pay for the convenience and luxuries which this industrialization brings. The Association, nevertheless, was concerned, he said, about the short-term and the long-term effects which the proposed facility might have upon the residents of the area and their environment. He referred, in particular, to the

potential problem related to the emission of gas and the seepage of liquid pollutants into Nanticoke Creek. In view of the responsibility of elected governments to protect their constituencies, he expressed the strong hope that the Ministry of the Environment would defer any final decision on this Application until such time as all possible known problems related to the disposal of such industrial wastes have been resolved. The brief made a number of suggestions as to how this might be accomplished.

During the night sitting of the Board on September 27, 1977, several members of the public addressed the Board. Their questions and comments related to a wide range of subjects, including the following:

- whether adequate liability insurance would be carried by the Applicant concerning any public injury or property damage which might arise from any aspect of the plant's operation;
- the feeling of some local people that this process of hearings, proposals, arguments and counter-arguments is a waste of time because it has already been determined by the government that this waste disposal site will be located on the property in question;

- the possibility of the operation commencing on a 100-acre farm but eventually expanding to several times that size in the future;
- the effect which the effluent from the plant might have on Nanticoke Creek should the Creek experience extremely low flows, as periodically happens;
- the concern that cash crops grown along the Creek for human consumption could become contaminated by the effluent from the plant, resulting in serious hazards to human health;
- the question of what benefits, on either the short-term or the long-term basis, would be derived by the residents of the area, should the project be approved, to compensate for the disadvantages of having this type of facility in their midst;
- the effect which the contamination of the Creek would have upon livestock watering at the Creek or upon those people whose livelihood depended on livestock operations;
- the effect which the contamination of the groundwater would have upon those who depend on wells in the area for their drinking water or for the watering of their livestock;

- the possibility of serious operating problems occurring at the plant, should it be approved, similar to those which have occurred at the Chem-Trol plant in Lewiston, New York, resulting in serious hazards to people and damage to the environment;
- the effect of the proposed plant on the livelihood of fishermen should contaminants reach the lake;
- the question of whether there might be more merit in locating this facility in another area where the need exists rather than in the Nanticoke area where, based on evidence presented at these hearings, it has been confirmed that neither Stelco nor Texaco require this proposed facility;
- the concern about the effectiveness of clay and a polyethylene liner in preventing seepage from the proposed facility into the groundwater;
- the question of whether adequate attention is being given by the Applicant to the recent announcement by the Ontario Research Foundation concerning a new advanced waste disposal process (Wetox).

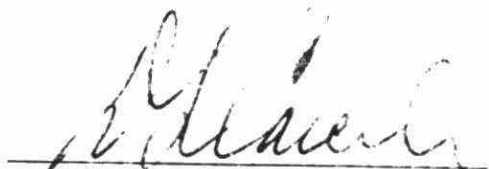
A number of local citizens, whose homes were in the general vicinity of the proposed site, also objected to the proposal on the basis of it adversely affecting property values in the area and generally

jeopardizing their quality of life, in the event of problems arising with respect to water or air pollution.

It was also indicated at the night session of the hearings that both the Council of the Regional Municipality of Haldimand-Norfolk and the Council of the City of Nanticoke were on record as being in opposition to this proposal (although no formal application for the consideration of the proposal had been received by either Council). It was suggested that if the Application for this industrial waste treatment facility were approved by the Ministry, the existing by-law would necessitate the matter being taken before the Ontario Municipal Board with a view to obtaining the proper zoning.

From the foregoing chapter, it will be evident that there was an unusual amount of public participation during these hearings, either in the form of submissions to the Board or in the form of questions and cross-examination of the witnesses. The Board is of the opinion that such participation contributed greatly to the value of these hearings.

This Report, containing the Board's conclusions, its recommendations and its reasons therefor, together with a summary of the evidence presented, is submitted to the Director of the Environmental Approvals Branch, Ministry of the Environment, in accordance with the requirements of The Environmental Protection Act and The Ontario Water Resources Act.


D. S. Caverly


D. C. Morton


G. E. Wilson, P.Eng.

April 20, 1978.

A P P E N D I C E S



Ministry of the
Environment

EPA R 33/

FOR MINISTRY USE ONLY

File A --

APPLICATION FOR A CERTIFICATE
OF APPROVAL FOR A WASTE
DISPOSAL SITE

IMPORTANT NOTE: This form must be submitted through the office of the Regional Waste Management Engineer. See back of form for instructions for completing this form.

Owner (Applicant) Under the Environmental Protection Act and the Regulations, this application is made by:—

The D & D Group

(Name)

211 King Street

(Address)

St. Catharines, Ontario

Type of disposal
site

For the REISSUE
Issue of a Certificate of
Approval for a

Waste Management System
including Landfill Site

Site location

Located

South half Lot 6, Concession 4,

(Walpole Twp.)

City of Nanticoke

IF APPLICATION IS FOR REISSUE, COMPLETE SECTIONS 4 AND 5 (A OR B)

Previous Certificate
details

Certificate
Provisional Certificate
of Approval:—
for this site was issued on:—

No. 197

Changes.

(A) The following changes in use, operation or ownership (have occurred since the date of the original application) OR (are proposed)

(B) No change in use, operation or ownership of the site has occurred since the date of the original application.



IF APPLICATION IS FOR ISSUE, COMPLETE SECTIONS 6 AND 7.

Operator.

The site will be operated in conformity with the Environmental Protection Act and the regulations by:—

Thomas W. Drew

(Name)

211 King Street, St. Catharines, Ontario

President, D & D Disposal Services

(Address)

Limited

Additional
information

The required supporting information to this application is attached.



Signature of Owner—Applicant

Signed this 6th day of May 1976



Ministry of the
Environment

ario

REPORTING INFORMATION TO AN
APPLICATION FOR APPROVAL OF
LANDFILL DISPOSAL SITE

APPLICANT TO COMPLETE ITEMS 1-4 INCLUSIVE

Site Details

APPLICANT

The D & D Group

South half Lot 6, Concession 4 (Walpole)

City of Nanticoke	
TOTAL AREA OF SITE	100 ACRES
TOTAL AREA TO BE UTILIZED FOR WASTE DISPOSAL	75 ACRES
ESTIMATED LIFETIME	20 YEARS
DISTANCE TO NEAREST POTABLE WELL	500 FT
DISTANCE TO WATER SUPPLY	500 FT
DISTANCE TO CEMETERY	N/A FT
DISTANCE TO NEAREST WATERCOURSE	200 FT
DEPTH OF WELL NOTED AT LEFT	35 FT
DISTANCE TO PUBLIC ROAD MEASURED FROM WORKING AREA	500 FT
DEPTH FROM ORIGINAL SURFACE TO BOTTOM OF WASTE	25 FT
DEPTH FROM ORIGINAL SURFACE TO TOP OF FILL	5 FT
GROUND CONDITIONS ENCOUNTERED MEASURED FROM ORIGINAL SURFACE	
Clay/loam	FROM surface TO 7"
Blue Clay	FROM 7" TO 30'
Bedrock	FROM 30' TO ?
DEPTH TO WATERABLE BELOW SURFACE	19 FT

GENERAL DESCRIPTION OF SITE (LOCATION, TOPOGRAPHY, ETC.)

Northwest corner of Nanticoke Road and 3rd Concession Road.

generally flat farmland.

PROPOSED USE OF LAND AFTER SITE FULLY UTILIZED

not known at this time

Wastes to be disposed of comprise

DOMESTIC	AGRICULTURAL WASTE	%
COMMERCIAL	HAZARDOUS WASTE	X %
INDUSTRIAL WASTE	HAULED SEWAGE	%
HAULED LIQUID INDUSTRIAL WASTE	OTHER	X %

Sludges from processing liquid industrial wastes

ORIGIN AND COMPOSITION OF LIQUID COMPONENTS OF WASTE OTHER THAN DOMESTIC AND COMMERCIAL

Solid and liquid wastes from primary and secondary industry.

FOR MINISTRY USE ONLY

File A --

110114

FOR REGIONAL OFFICE USE

Authorities consulted:	OBJECTION	NO OBJECTION
HEALTH UNIT	<input type="checkbox"/>	<input type="checkbox"/>
A M B	<input type="checkbox"/>	<input type="checkbox"/>
MUNICIPALITY	<input type="checkbox"/>	<input type="checkbox"/>
CONSERVATION AUTHORITY	<input type="checkbox"/>	<input type="checkbox"/>
SANITARY ENGINEERING	<input type="checkbox"/>	<input type="checkbox"/>
INDUSTRIAL WASTES	<input type="checkbox"/>	<input type="checkbox"/>
WATER QUANTITY	<input type="checkbox"/>	<input type="checkbox"/>
OTHER	<input type="checkbox"/>	<input type="checkbox"/>

Inspection Record Forms attached Yes No

Number of Forms

Regional Engineer's Report attached

	REQUIRED	AVAILABLE
Ground Water monitoring	Yes No	Yes No
Surface Water monitoring	Yes No	Yes No

3. Quantities

TOTAL TONS PER DAY

50 solid waste

TOTAL GALLONS PER YEAR
up to 10 million gallon

ESTIMATED ☒ OR MEASURED ☐

SITE OPENED 7 DAYS FROM 12 mid. TO 12 mid.

POPULATION SERVED N/A

NAMES OF MUNICIPALITIES SERVED

N/A

OFFICIAL PLAN ☒

ZONING BY-LAW ☒

SITE LAND ZONED

Agricultural

ADJACENT LAND ZONED

agricultural &

industrial

EQUIPMENT OWNED ☒

RENTED ☒

4. The following documents are attached

Attached letter of explanation & description of operation

" site plan

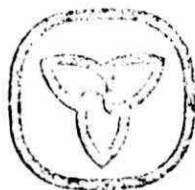
Thomas W. Drew

PREPARED BY

May 6th, 1976

DATED

SIGNATURE OF OWNER/APPLICANT



Ontario

Ministry of the
Environment

4-080-76

NOO. 4/76.

**APPLICATION FOR THE APPROVAL OF PLANS AND SPECIFICATIONS FOR THE
CONSTRUCTION OF WORKS FOR THE COLLECTION, TRANSMISSION,
TREATMENT AND DISPOSAL OF LIQUID INDUSTRIAL WASTES**

SUBMITTED IN ACCORDANCE WITH SECTION 42,
THE ONTARIO WATER RESOURCES ACT, R.S.O. 1970, CHAPTER 332, AS AMENDED

NOTE:

- (1) An application for approval shall contain the completed, attached questionnaire and appendices, and all plans, reports, etc., to satisfy items A to D below where applicable and shall be submitted in duplicate.
- (2) Information on the Ministry's industrial pollution control policy, program and procedures is provided in the Information Brief, Environmental Approvals Branch and should be read prior to completing this form.
- (3) New mines and ore milling companies are also required to complete the Ministry's Mineral Industries Information Sheet Parts I - V.
- (4) Companies establishing manufacturing or production facilities that may produce wastewater having potentially harmful waste characteristics are required to complete Biological and/or Receiving Water Quality Information Sheets together with such other information as the Ministry may require.

A. Manufacturing Plant Process Description, Water Supply and Waste Disposal

A flow diagram and a written description of the industrial manufacturing process in sufficient detail shall be submitted to indicate:

- Quantity and quality of service water used in a specific process or industrial operation (Item 6, see questionnaire)
- Quantity and measured or estimated quality of liquid waste streams arising from water or other liquid use (Items 7 and 11). In this regard, data such as bioassay results and/or data related to potential toxicity, taste and odour problems or fish tainting shall be submitted where applicable on any characteristic or component of the waste that may adversely affect the environment of the receiving watercourse.

Where the quantity and/or quality of the waste varies according to industrial operating procedure or production rate, the variation in rates of waste flow (average, maximum and minimum) and the maximum and average concentrations of the significant waste components shall be given.

B. Report on Design of Proposed Waste Treatment Works

Engineering reports on the proposed treatment works should be submitted and shall indicate:

- Expected flow and concentrations of liquid industrial wastes, and means of measuring, from all processes contributing to the treatment plant influent (Items 7 and 11).
- A flow diagram relating the proposed treatment processes.
- Function, capacity and operation of the individual components comprising the treatment facilities, and the system as a whole. Performance data should be given where possible.
- Quantities of treatment chemicals.
- Expected degree of reduction in pollutional load to be effected by the system. Supporting research or pilot plant data shall be given where possible.
- A statement setting forth the expected bacterial, physical, chemical and other known characteristics of the treated effluent (Item 13).
- Method of sludge disposal, and disposal of other solid or liquid process wastes.

C. Physical Lay-Out

1. A general arrangement or lay-out sketch of the property shall be submitted (to scale or approximate) to coordinate buildings, treatment or disposal works, property boundaries, municipal boundaries, effluent lines, points of discharge of outfalls in relation to the receiving water, and municipal sanitary sewer connections.

2. Also, drawings or sketches of plant areas in sufficient detail to indicate:

Size and location of industrial process equipment concerned.

Location and sizes of collection and transmission sewers including sewers transporting uncontaminated waters entering the treatment or effluent system. Existing sewers shall be differentiated from proposed sewers and direction of flow in sewers shall be shown.

Location of all equipment involved in the proposed treatment, control or disposal of wastes. Existing equipment shall be differentiated from proposed equipment.

D. Plans of Treatment Works

1. Engineering drawings shall include plans and profiles of each unit in the treatment or control system.

2. Plans and profiles of outfall sewers at the receiving water should also be submitted.

Under the Act, the undersigned, as owner ☒ or agent ☐ , applies for approval of plans and specifications, submitted herewith for the construction of

new industrial wastes treatment or control works ☒

a modification or addition to existing industrial wastes works ☐

consisting of: (brief description of proposal as related to this application)

chemical oxidation and reduction; neutralization; liquid/sludge separation;
carbon adsorption; biological polishing of effluent and controlled discharge;
and solids disposal in a lined scientific landfill

and submits the following information:

1. Name of Applicant Nanticoke Waste Management Ltd. 688-5569
(Company, corporation, owner) (telephone number)

211 King Street St. Catharines, Ontario
(postal address) (county)

2. Location of Industry Lot 6 Concession #4 (formerly Township of Walpole) City of Nanticoke
(number, street, road or lot number, municipality, county)

NOTE: For plants producing various products or having a number of waste producing operations, items 3 to 23 which follow, should cover only details concerned with the specific proposal under consideration, including all inter-related process and treatment systems.

3. Production Data (List principal materials used and products produced, giving volume, weight, or quantity per day, week or other production period.)

Raw Materials Not Applicable

Products Not Applicable

Current Production Level Not Applicable

Future Production level and date Not Applicable

4. Industrial Operating Schedule

hours per day 24

days per week 5

weeks per year 52

indicate shift periods 8 A.M. - 4 P.M. ; 4 P.M. - 12 midnight ; 12 midnight - 8 A.M.

5. Number of Employees:

Office (Admin., Management) 3 (1st Year) 9 (5th Year)

Production 11 (1st Year) 21 (5th Year)

6. Water Supply:

Source of Water		Imperial Gallons Per Day			
		Average	Maximum	Minimum	
(a)	Industrial Processes	None Required			
(b)	Cooling, Condensers, Compressors	None Required			
(c)	Drinking and Sanitary	Well & Bottled	550	750	350
(d)	Other Laboratory	Well	150	200	100
TOTAL SUPPLY			700	950	450

If daily supply varies from above total, explain in appendix. ☐

NOTE: If water in excess of 10,000 gallons per day is to be taken from other than a municipal water supply, approval is required from the Ministry's Water Resources Branch, Toronto. (Section 37, Ontario Water Resources Act).

7. Waste Disposal:

Origin of Wastes or Description		Imperial Gallons Per Day		
		Average	Maximum	Minimum
(a)	Process Waste Streams (itemize)	Please refer to Nanticoke Waste Management Facility Report		
(b)	Batch Discharges	Please refer to Section C, Nanticoke Waste Management Facility Report		
(c)	Cooling and Condenser Water	None		
(d)	Sanitary Sewage	Septic Tank; Please refer to Section E, Nanticoke Waste Management Facility Report		
(e)	Other			
TOTAL				

If combined daily waste flow for disposal varies from above total, explain in appendix. ☐

8. Proposed route to, and ultimate point of waste discharge (municipal sewer, surface drain, lake, river, pond, leaching pit, etc. Give name of surface drain, lake or river. If discharge is to a tributary, also give name of main watercourse.)

- (a) Process Wastes (itemize) None
- (b) Batch Discharges Reclaimed Water to Nanticoke Creek via Tributary
Please refer to Section G, Nanticoke Waste Management Facility Report.
- (c) Cooling and Condenser Water ... None
- (d) Sanitary Sewage Please refer to Section E, Nanticoke Waste Management Facility Report.
- (e) Other

9. Where a new connection or an increased effluent discharge to a municipal sewer is proposed, municipal authorization is required. Has this authorization been obtained?

Yes ☐

No ☐

10. List all chemicals used, produced, stored, or otherwise present on plant property which could, by any means, drain, gain access or be discharged directly or indirectly in any effluent or waste flow leaving the plant or plant property.

Name of Chemical	Use of Chemical in Plant	Amount Lost to Effluent or Watercourse
------------------	--------------------------	--

Hydrated Lime	Neutralization	None
Hydrochloric Acid	pH Adjustment	None
Carbonate, Nitrate,	Water Reclamation	None
and Hexametaphosphate	System

See appendix for discussion. Please refer to Nanticoke Waste Management Facility Report for further detail. [X]

11. Thermal Characteristics

(a) Water Supplies

What are the expected temperatures in °F of the industrial process and cooling water supplies outlined in Section 6?

	Not Applicable	(May	October)	(November	April)
Process:		Avg. °F	Max. °F	Avg. °F	Max. °F
Cooling:		Avg. °F	Max. °F	Avg. °F	Max. °F

(b) Waste Streams

What are the expected temperatures in °F of the treated effluents or process wastewater and spent cooling water streams outlined in Section 7?

	(May	October)	(November	April)
Process or treated effluents (itemize)	Avg. °F	Max. °F	Avg. °F	Max. °F
Reclaimed Water	Ambient		Ambient	
.....				
.....				
.....				
.....				

(c) If the waste streams listed in (b) are to be combined with existing waste discharges, what are the expected temperatures and volumetric flow rates of each combined discharge?

Combined discharge description	(May - October)		(November - April)		Combined flow - Imperial gallons per day	
	Avg. °F	Max. °F	Avg. °F	Max. °F	Avg.	Max.
Not Applicable
.....
.....
.....
.....

12. Expected Characteristics of Waste Effluents before treatment

.....

See appendix for analytical detail Please refer to Nanticoke Waste Management Facility Report ☒

13. Expected Characteristics of treated waste flows and final effluent

.....

See appendix for analytical detail Please refer to Nanticoke Waste Management Facility Report ☒

14. Proposed method of treated effluent flow measurement

continuous flow recording device ☒
 non-recording device ☐
 other ... Please refer to Section G, Nanticoke Waste Management Facility Report ☒
 see appendix ☒

15. Proposed Effluent Quality Monitoring Program (See Information Brief) Refer to Section G, Nanticoke Waste Management Facility Report

(a) automatic continuous sampling ☒
 periodic composite sampling ☒
 periodic grab samples ☒

Sampling frequency once per shift ☐ daily ☒ weekly ☐ monthly ☐ batch ☒

(b) Samples to be analyzed for

BOD₅ ☒ Suspended Solids ☒ pH ☒
 Others ☒ Conductivity ☒ TOC ☒ dissolved O₂ ☒

See appendix for detail Refer to Section G, Nanticoke Waste Management Facility Report ☒

16. If a leaching pit, oxidation pond, or spray or land irrigation system is proposed, the distance to the nearest:

- (a) Surface watercourse is Please refer to Nanticoke Waste Feet
(b) Private well is Management Facility Report Feet
(c) Municipal well is Feet
(d) Dwelling or built-up area is Feet

17. Power failures indicate the number and duration of power failures during the past five years:

number and dates:

duration of each:

see appendix Refer to Section E, Nanticoke Waste Management Facility Report [X]

18. Describe facilities that will be available or precautions that will be taken to prevent the discharge of untreated wastes or the discharge of any material that could impair the quality of the receiving water in the event of power failures, treatment plant mechanical failures or manufacturing plant equipment failures involving spills or leaks. (Items such as standby pumps, emergency holding tanks, spill ponds, etc., are to be included here.)

.....
.....
.....
.....
.....

See appendix Refer to Section E, Nanticoke Waste Management Facility Report [X]

19. Are any solid wastes, other than those which can be picked up by the local garbage collection agency, generated in the process:

Yes [X]

No []

If yes, describe nature and quantity Neutralization Sludge; refer to Section C,
Nanticoke Waste Management Facility Report

20. Proposed starting date for construction of proposed industrial waste treatment or control works May 1, 1977

Proposed completion date of works October 1, 1977

21. Estimate of capital cost of proposed industrial waste treatment or control works

Breakdown of capital cost estimate

Equipment	725,000.00
Labour	
Land	200,000.00
Other Buildings	275,000.00
Total	1,200,000.00

See appendix []

Engineering Charges 100,000.00

Estimate of annual costs of operation 1st year 1,278,000.00

5th year 2,205,000.00

22. Describe the manner in which the proposed facilities are to be operated. (Operating procedures should include a schedule of operation, manpower requirements, maintenance schedule, etc. Operator qualifications should also be indicated.)

Refer to Section E, Nanticoke Waste Management Facility Report, Appendix... [X]

23. Study of performance or operating efficiency of installed treatment system. State:

How and when will the performance evaluation program be carried out. The present system is based on a system in operation at Chem-Trol Pollution Services, Inc., Model City, N.Y., U.S.A. Please refer to Nanticoke Waste Management Facility... Appendix... [X]

Who will make the evaluation... Report... Appendix... ☐

Submitted in accordance with Section 42 and with the knowledge of Section 77, The Ontario Water Resources Act.

Date November 3, 1976

Thomas W. Drew

(Printed Name of Officer of Owner)

Thomas W. Drew
(Signature)

President

(Title)

NOTE: If signed by an agent, written authorization duly executed by the proper officers of the owner must accompany this application.

**CHECK LIST TO BE USED BY APPLICANT
IN ASSEMBLING COMPLETED APPLICATION
CONSISTING OF REPORTS, PLANS, DIAGRAMS, ETC.**

- (1) Engineering report on treatment works including the required information (item B) and appropriate appendices of the questionnaire... ☐
- (2) Flow diagram of manufacturing processes indicating origin of waste flows (item A)... ☐
- (3) Flow diagram of proposed waste treatment or control works (item B)... ☐
- (4) General arrangement drawing or sketch of plant property to coordinate buildings, treatment works, outfalls, etc... ☐
- (5) Sewer layout drawing (items 4 and 5 may be combined on one drawing, if convenient)... ☐
- (6) Engineering drawings showing plans and profiles of each unit in the treatment or control system... ☐
- (7) Mineral Industries Information Sheet, if applicable... ☐
- (8) Application duly signed... ☐

FOR OFFICE USE ONLY

.....
(Name of Company or Other Owner)

Application to

**MINISTRY OF THE ENVIRONMENT
ONTARIO**

for Constructing

INDUSTRIAL WASTE TREATMENT WORKS

INDUSTRIAL WASTE SEWERS

MISCELLANEOUS STRUCTURES

TO THE DIRECTOR, ENVIRONMENTAL APPROVALS BRANCH

The work herein described in this application by

..... of

is recommended for approval with the issue of certificate for

..... with the proviso

that

.....

Date

Reviewed by Supervisor,
Industrial Approvals Branch

LIST OF PARTICIPANTSFor Nanticoke Waste Management Limited

- Mr. M. P. Forestell, Q.C. - Forestell, Talmadge & Hugill
- Mr. D. C. Hugill - Forestell, Talmadge & Hugill
- Mr. T. W. Drew - President, Nanticoke Waste Management Limited
- Mr. D. J. Kuhn - Secured Landfill Contracts Inc.
- Mr. L. G. Bryck - Hydrology Consultants Ltd.
- Mr. D. L. Colborne - Staff Industries Canada Limited
- Dr. K. C. Malinowski - SCA Services Inc.
- Mr. R. A. Stadelmaier - President, Recra Research Inc.
- Mr. R. Rakoczynski - Plant Manager, Chem-Trol

For Regional Municipality of Haldimand-Norfolk

- Mr. C. A. Cline - Cline and Backus
- Mr. K. Richardson - Regional Chairman
- Mr. L. Kennaley - Regional Planner
- Mr. L. S. Love - President, L. S. Love & Associates Ltd.
- Mr. P. K. Lee - President, Gartner Lee Associates Ltd.
- Mr. C. Schultz - Supt. Public Works, Town of Lewiston, N.Y.,
U.S.A.

For the City of Nanticoke

- Mr. H. A. Winter - Solicitor
- Mr. G. M. Dmetriuc - Mayor
- Mr. N. Walpole

For the Constituency of Haldimand-Norfolk

- Mr. G. I. Miller, M.P.P.

For the Ministry of the Environment

- Mrs. L. McCaffrey - solicitor
- Mr. R. Johnson
- Mr. G. Craig
- Mr. S. Bell
- Mr. E. W. C. Turner
- Mr. G. Pearce
- Mr. A. W. McLarty
- Mr. S. Beszedits
- Mr. J. Viirland
- Dr. G. Hughes
- Dr. O. Meresz
- Mr. J. Vogt
- (Dr. M. Palmer)

For Haldimand Federation of Agriculture

- Mr. L. P. Thibideau - Marshall and Thibideau
- Mr. A. W. McMillan
- Mr. H. Eubank - Member, Farm Pollution Advisory Committee
- Mr. J. Wilkinson - Kaiser Group
- Dr. J. Scharer - University of Waterloo
- Mr. W. Gordon - United Co-operatives of Ontario

For Nanticoke Ratepayers Association

- Mr. N. Borkovich - Borkovich and Borkovich

For Citizens Committee for the Preservation
of the Environment, and
The Jarvis Board of Trade

- Mr. W. E. Kelly - solicitor

For the Port Dover Board of Trade

- Mrs. E. Huxley
- Mrs. P. Scruton

For Norfolk Federation of Agriculture

- Mr. R. Walker

For Haldimand-Norfolk Conservation Authority

- Mr. R. Hunter

For Pollution Probe

- Ms. J. Opperman

For Hagersville Water Improvement Committee

- Mr. F. McCarthy

For Haldimand-Norfolk Christian Farmers Association

- Mr. J. Vanderkooy

For Alternative Magazine

- Mr. G. Copp

For the Steel Co. of Canada Limited

- Mr. H. Eisler - Environmental Control Manager

For Eastern Lake Erie Trawlers Association

- Mr. C. H. Gamble - President

For Hickory Beach Cottagers Association, and
For Haldimand-Norfolk Waste Disposal Committee

- Mr. C. Steffler

For Haldimand-Norfolk Pollution Control Committee

- Dr. J. Sykes

Appearing on Their Own Behalf

- Mr. D. Royal
- Mr. Stubbs
- Mrs. Sobutas
- Mr. C. Thomson
- Mr. W. Lindsay
- Mrs. M. Thomson
- Mr. Smith
- Mr. J. Brohman
- Mr. Marsh
- Mr. P. Vandermeer
- Mrs. E. Banfield
- Mr. D. Deller
- Mr. S. Tomkins
- Mrs. M. Buckley
- Mrs. A. E. Hoover
- Ms. J. Reu
- Mr. W. Warshawsky
- Mrs. R. Hildon
- Mr. J. Hamilton
- Ms. M. Lindsay
- Mr. C. Lee
- Mr. C. Camblin

Letters and Briefs read into the Record

- Elmcrest Association of Port Dover - Mr. R. MacDonald, President
- Mrs. R. Fuller
- R. & P. MacDonald
- City of Nanticoke - Mr. G. M. Dmetriuc, Mayor
- Port Dover Board of Trade - Ms. C. Brooks, President--Telegram
- W. & N. Lasouski
- C.N.Rail, Great Lakes Region - Mr. R. J. Spence,
Environmental Protection Officer

Letters and Briefs read into the Record (continued)

- Nanticoke Ratepayers Association
- Norfolk Federation of Agriculture - Mr. A. Wren, President
- Ethel L. Kindree
- Nanticoke United Church of Canada - Mrs. E. Banfield,
Recording Steward.
- Nanticoke United Church Sunday School - Mrs. James W. Lindsay
- Eastern Lake Erie Trawlers Association - Mr. C. H. Gamble,
President
- Mr. G. Hobbs, Nanticoke
- Nanticoke United Church Women - M. Thomson and L. Thomson
- Ms. N. Huxley, Port Dover
- Haldimand West Women's Institute:
 - Mrs. V. Anderson,
 - Mrs. H. Martindale,
 - Mrs. J. A. Fleming,
 - Mrs. W. Lamb
- Ms. H. Awde
- Mr. and Mrs. G. Mitchell
- Mr. and Mrs. W. deVries
- Mr. and Mrs. R. deVries
- Women's Institute of Jarvis:
 - Mrs. R. Smuck,
 - Mrs. G. Anderson
- Mrs. M. M. Buckley
- Nanticoke Creek Ratepayers Association
- Hickory Beach Cottagers Association, Nanticoke,
Mrs. J. B. Linklater
- Nanticoke United Church of Canada - The Reverend R. Hyde
- Mr. C. J. Maas
- Mrs. G. Donaldson
- Mr. and Mrs. R. Doughty
- Mr. and Mrs. A. Evans.

-----oOo-----

CHRONOLOGY

Environmental Assessment Board Report on the Public Hearings on the Applications by Nanticoke Waste Management Limited to the Ontario Ministry of the Environment for Approval for a Waste Disposal Site which would Include Facilities for Liquid Waste Treatment and for Landfilling Hazardous Industrial Wastes -- June 7, 1977 - February 16, 1978 -- Jarvis, Ontario

Day 1 - Session (1) -- Tuesday, June 7, 1977
Community Centre, Jarvis.

10:00 a.m.

1. Introductory Remarks by Chairman -- reading of notices by Mr. F. A. Voegelé, Executive Director, Environmental Assessment Board and Acting Secretary.
2. Introductory Remarks - Mr. M. P. Forestall -- representing Nanticoke Waste Management Limited.
3. Presentation - Mr. G. T. Miller, M.P.P., Haldimand-Norfolk.
5. Presentation - Mrs. E. Huxley - Port Dover Board of Trade.
6. Presentation - L. P. Thibideau, Counsel for Haldimand Federation of Agriculture (request for adjournment).
7. Presentation - F. McCarthy - representing Hagersville Water Improvement Committee.
8. Presentation - T. A. Cline - representing the Regional Municipality of Haldimand-Norfolk (request for adjournment).
9. Presentation - Mr. R. Hunter, Long Point Conservation Authority.
10. Reply by Mr. Forestall.
11. Presentation - Mrs. L. McCaffrey representing the Ministry of the Environment.
12. Reply by Mr. Thibideau.

Adjournment 12:00 Noon until 1:30 p.m.

Day 1 - Session (2) -- Tuesday, June 7, 1977
Community Centre, Jarvis.

1:30 p.m.

1. Preliminaries.
2. Brief Mr. H. Eisler - Environmental Control Manager, Stelco.
3. Presentation - T. W. Drew - President, Nanticoke Waste Management Limited. (1st Witness)
4. Presentation - D. J. Kuhn, Secured Landfill Contractors Incorporated - 2nd Witness, for Nanticoke Waste Management Limited.
5. Questions for Clarification.
6. Presentation of Brief - C. Thompson.
7. Presentation of Brief - W. Lindsay.
8. Briefs read into Record by F. A. Voegel:
9. Elmcrest Associates
10. Ms. E. Fuller
11. City of Nanticoke
12. Pt. Dover Board of Trade
13. Mr. & Mrs. W. Lasouski (letter)
14. C. N. Rail
15. Nanticoke Ratepayers' Association
16. Closing Remarks.
17. Adjournment until 10:30 a.m., Tuesday, August 9, 1977.

Day 2 - Session (3) -- Tuesday, August 9, 1977
Community Centre, Jarvis.

10:00 a.m.

1. Preliminaries - Filing of Exhibits etc.
2. Presentation of Brief (Exhibit #7) by Mr. T. W. Drew, President of Nanticoke Waste Management Limited.

Day 2 - Session (3) Continued

3. Mr. Drew - Cross-examination by Mr. T. A. Cline representing the Regional Municipality of Haldimand-Norfolk.
4. Mr. Drew - Cross-examination by Mrs. L. McCaffrey Representing the Ministry of the Environment.
5. Adjournment - 12:30 p.m. until 1:45 p.m.

Day 2 - Session (4)

1:45 p.m.

1. Preliminaries.
2. Mr. Drew - Cross-examination by L. P. Thibideau representing the Haldimand Federation of Agriculture.
3. Mr. Drew - Cross-examination by Mr. N. Borkovich representing the Nanticoke Ratepayers' Association.
4. Questions from audience.
5. Presentation - Mr. D. J. Kuhn, Nanticoke Waste Management Limited.
6. Adjournment - 4:30 p.m. until 9:30 a.m. Wednesday, August 10, 1977.

Day 3 - Session (5) -- Wednesday, August 10, 1977.
Community Centre, Jarvis.

9:40 a.m.

1. Preliminaries
2. Mr. Kuhn - Cross-examination by Mr. Cline representing the Regional Municipality of Haldimand-Norfolk.
3. Adjournment - 12:00 Noon until 1:45 p.m.

Day 3 - Session (6)

1:50 a.m.

1. Preliminaries.
2. Mr. Kuhn - Cross-examination by Mrs. L. McCaffrey representing the Ministry of the Environment.
3. Mr. Kuhn - Cross-examination by Mr. Thibideau representing the Haldimand Federation of Agriculture.
4. Mr. Kuhn - Cross-examination by Mr. Borkovich representing the Nanticoke Ratepayers' Association.
5. Adjournment 4:45 p.m. until 9:30 a.m. Thursday, August 11, 1977.

Day 4 - Session (7) -- Thursday, August 11, 1977
Community Centre, Jarvis.

9:35 a.m.

1. Preliminaries - Filing of Exhibits.
2. Mr. Kuhn - Cross-examination by Mr. W. Kelly representing Haldimand-Norfolk Pollution Control Committee.
3. Questions from the audience and Board members.
4. Mr. Kuhn - Re-examination by Mr. Forestell.
5. Mr. L. G. Bryck - Hydrology Consultants Limited - Witness for Nanticoke Waste Management Limited - Examination-in-Chief by Mr. Forestell.
6. Adjournment - 11:50 a.m. until 1:30 p.m.

Day 4 - Session (8)

1:35 p.m.

1. Mr. Bryck - Cross-examination by Mr. Cline.
2. Mr. Bryck - Cross-examination by Mrs. McCaffrey.
3. Mr. Bryck - Cross-examination by Mr. Kelly.
4. Mr. Bryck - Cross-examination by Mr. Thibideau.
5. Mr. Bryck - Questions from audience and Board.

Day 4 - Session (8) Continued

6. Mr. Bryck - Re-examination by Mr. Forestell.
7. Mr. D. Colborne - Staff Industries Canada Limited -
Witness for Nanticoke Waste Management Limited -
Examination-in-Chief by Mr. Forestell.
8. Adjournment - 4:15 p.m. until 9:30 a.m. Friday,
August 12, 1977.

Day 5 - Session (9) -- Friday, August 12, 1977
Community Centre, Jarvis.

9:00 a.m.

1. Preliminaries.
2. Presentations and Questions from audience:
 - Mrs. Vandermeer
 - Mrs. E. Bonfield
 - Mrs. M. Thomson
 - Mr. J. Brokman
 - Mr. D. Thomson
 - Mr. D. Deller
 - Ms. N. Huxley
3. Reading of letters into Record by W. Kelly.
4. Presentation of Brief - Norfolk Federation of Agriculture
- Mr. R. Walker.
5. Mr. Drew - further cross-examination by Mr. Cline.
6. Mr. Drew - further cross-examination by Mr. Kelly.
7. Adjournment 11:00 a.m. until 10:30 a.m. Tuesday, August
16, 1977.

Day 6 - Session (10) -- Tuesday, August 16, 1977
Community Centre, Jarvis.

1. Reading previous Exhibits into Record.
2. Mr. Drew - further cross-examination by Mr. N. Borkovich.
3. Mr. D. Colborne - Cross-examination by Mr. Thibideau.
4. Adjournment - 11:50 a.m. until 1:30 p.m.

Day 6 - Session (11) -- Tuesday, August 16, 1977
Community Centre, Jarvis.

1:55 p.m.

1. Mr. Colborne - Cross-examination by Mr. Cline.
2. Mr. Colborne - Cross-examination by Mr. Borkovich.
3. Mr. Colborne - Questions from Audience and Board.
4. Mr. Colborne - Re-examination by Mr. Forestell.
5. Mr. R. A. Stadelmaier - Witness for Nanticoke Waste Management Limited - Examination-in-Chief by Mr. Forestell.
6. Adjournment - 4:25 p.m. Until 9:30 a.m. Wednesday, August 17, 1977.

Day 7 - Session 12 -- Wednesday, August 17, 1977
Community Centre, Jarvis.

9:35 a.m.

1. Preliminaries - Reading into Record - Previous Exhibits.
2. Mr. Stadelmaier - Examination-in-Chief by Mr. Forestell continued.
3. Mr. Stadelmaier - Cross-examination by Mr. Kelly.
4. Adjournment - 12:10 p.m. until 1:45 p.m.

Day 7 - Session (13)

1:45 p.m.

1. Mr. Stadelmaier - Cross-examination by Mrs. McCaffrey.
 2. Mr. Stadelmaier - Cross-examination by Mr. Thibideau.
 3. Mr. Stadelmaier - Cross-examination by Mr. Cline.
 4. Adjournment - 4:00 p.m. until 9:30 a.m. Thursday, August, 18, 1977.
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Day 8 - Session (14) -- Thursday, August 18, 1977
Port Dover Public School.

9:00 a.m.

1. Preliminaries.
2. Presentation of Brief - Mrs. N. Huxley representing the Port Dover Board of Trade.
3. Mr. Stadelmaier - Cross-examination by Mr. Cline continued.
4. Questions from audience and Board.
5. Mr. Stadelmaier - Re-examination by Mr. Forestell.
6. Dr. K. C. Malinowski - Witness for Nanticoke Waste Management Limited - Examination-in-Chief by Mr. Forestell.
7. Adjournment - 11:55 a.m. until 1:30 p.m.

Day 8 - Session (15)

1:45 p.m.

1. Dr. Malinowski - Cross-examination by Mr. Kelly.
2. Dr. Malinowski - Cross-examination by Mr. Cline.
3. Adjournment - 4:15 p.m. until 9:30 a.m. Friday, August 19, 1977.

Day 9 - Session (16) -- Friday, August 19, 1977
Port Dover Public School.

9:30 a.m.

1. Preliminaries.
 2. Dr. Malinowski - Cross-examination by Mr. Cline continued.
 3. Dr. Malinowski - Cross-examination by Mrs. L. McCaffrey.
 4. Adjournment 12:00 Noon until 2:00 p.m. Monday, September 26, 1977.
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Day 10 - Session (17) -- Monday, September 26, 1977
Community Hall, Hamlet of Nanticoke.

2:00 p.m.

1. Preliminaries - Filing of Exhibits.
2. Dr. Malinowski - Cross-examination by Mr. Borkovich.
3. Dr. Malinowski - Questions from audience and Board.
4. Motion by Mr. Borkovich to close Hearing.
5. Discussion.
6. Adjournment - 3:15 p.m. until 9:30 a.m. Tuesday, September 27.

Day 11 - Session (18) -- Tuesday, September 27, 1977
Community Centre, Jarvis.

9:30 a.m.

1. Filing of Notice of Motion by Mr. N. Borkovich.
2. Filing of Notice of Motion by Mr. Cline.
3. Argument by Mr. Borkovich.
4. Argument on Borkovich Motion by Mr. Forestell.
5. Argument on Borkovich Motion by Mrs. McCaffrey.
6. Reply by Mr. Borkovich.
7. Further Arguments - Messrs. Thibideau and Kelly.
8. Argument on Cline Motion - Mr. Cline.
9. Argument on Cline Motion - Mr. Thibideau.
10. Argument on Cline Motion - Mr. Borkovich.
11. Argument on Cline Motion - Mr. Forestell.
12. Argument on Cline Motion - Mrs. McCaffrey.
13. Reply by Mr. Cline.
14. Short Adjournment.
15. Reconvened - Adjournment until 8:00 p.m. Tuesday, September 27, 1977 (Night Sitting).

Day 11 - Session (19) -- Tuesday September 27, 1977
(NIGHT SITTING) Community Centre, Jarvis.

8:00 p.m.

1. Introductory remarks - Chairman.
2. Presentations by citizens:
 - Mr. C. Steffler
 - Mr. S. Tomkins
 - Ms. M. Buckley
 - Mr. B. Donaldson
 - Mrs. A. E. Hoover
 - Ms. M. Thomson
 - J. Reu
 - Mr. Walter Warshawski
 - C. T. Maas
 - Mrs. N. Huxley
 - Spontaneous presentations
3. Adjournment - 10:05 p.m. until 10:00 a.m. Wednesday, September 28, 1977.

Day 12 - Session (20) -- Wednesday, September 28, 1977
Community Centre, Jarvis.

10:00 a.m.

1. Filing of Exhibits and other preliminaries.
2. Mr. S. Bell, Approvals Engineer, Ministry of the Environment - Examined by Mrs. McCaffrey.
3. Mr. Bell - Cross-examination by Mr. Borkovich.
4. Reading of Board Statement on "Notices of Motion" by Chairman.
5. Short Adjournment.
6. Preliminary statements - Mrs. McCaffrey.
7. Mr. E. Turner - First witness for Ministry of the Environment - Examination-in-Chief - Mrs. McCaffrey.
8. Adjournment 12:00 Noon until 1:45 p.m.

Day 12 - Session (21) -- Wednesday, September 28, 1977
Community Centre, Jarvis.

1:45 p.m.

1. Mr. Turner - Cross-examination by Mr. Forestell.
2. Mr. Turner - Cross-examination by Mr. Cline.
3. Mr. Turner - Cross-examination by Mr. Borkovich.
4. Mr. Turner - Cross-examination by Mr. Thibideau.
5. Mr. Turner - Cross-examination by Mr. Kelly.
6. Mr. Turner - Questions from audience.
7. Adjournment - 4:40 p.m. until 9:30 a.m. Thursday, September 29, 1977.

Day 13 - Session (22) -- Thursday, September 29, 1977
Community Centre, Jarvis.

9:30 a.m.

1. Preliminaries - filing of Exhibits.
2. Mr. G. Pearce - Second witness for the Ministry of the Environment - Examination-in-Chief - Mrs. McCaffrey.
3. Mr. Pearce - Cross-examination by Mr. Forestell.
4. Mr. Pearce - Cross-examination by Mr. Cline.
5. Adjournment - 12:30 p.m. until 2:00 p.m.

Day 13 - Session (23)

2:00 p.m.

1. Mr. Pearce - Cross-examination by Mr. Cline continued.
2. Mr. Pearce - Cross-examination by Mr. Kelly.
3. Mr. Pearce - Questions from audience and Board.

Day 13 - Session (23) Continued

4. Mr. A. McLarty - Third witness for the Ministry of the Environment - Examination-in-Chief - Mrs. McCaffrey.
 5. Mr. McLarty - Cross-examination by Mr. Forestell.
 6. Mr. McLarty - Cross-examination by Mr. Thibideau.
 7. Mr. McLarty - Cross-examination by Mr. Cline.
 8. Mr. McLarty - Cross-examination by Mr. Kelly.
 9. Questions from audience and Board.
 10. Re-examination by Mrs. McCaffrey.
 11. Address to Solicitors.
 12. Adjournment - 4:30 p.m. until 9:30 a.m. Friday, September 30, 1977.
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Day 14 - Session (24) -- Friday, September 30, 1977
Community Hall, Hamlet of Nanticoke.

9:40 a.m.

1. Preliminaries.
 2. Mr. G. Craig - Fourth witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.
 3. Mr. Craig - Cross-examination by Mr. Forestell.
 4. Mr. Craig - Cross-examination by Mr. Cline.
 5. Mr. Craig - Cross-examination by Mr. Kelly.
 6. Questions from audience and Board.
 7. Mr. S. Beszedits - Fifth witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.
 8. Mr. S. Beszedits - Cross-examination by Mr. Forestell.
 9. Mr. S. Beszedits - Cross-examination by Mr. Cline.
 10. Mr. S. Beszedits - Cross-examination by Mr. Kelly.
 11. Questions from audience.
 12. Adjournment-12:20 p.m. until 9:30 a.m. Wednesday, October 12, 1977.
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Day 15 - Session (25) -- Wednesday, October 12, 1977
Community Centre, Jarvis.

9:30 a.m.

1. Preliminaries - Filing of Exhibits, etc.
2. Debate over exclusion of Witness.
3. Mr. J. Viirland - Sixth witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.
4. Mr. Viirland - Cross-examination by Mr. Forestell.
5. Mr. Viirland - Cross-examination by Mr. Cline.
6. Mr. Viirland - Cross-examination by Mr. Thibideau.
7. Questions from audience and Board.
8. Adjournment - 12:30 p.m. until 2:00 p.m.

Day 15 - Session (26)

2:00 p.m.

1. Dr. G. Hughes - Seventh witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.
2. Dr. Hughes - Cross-examination by Mr. Forestell.
3. Dr. Hughes - Cross-examination by Mr. Cline.
4. Dr. Hughes - Cross-examination by Mr. Thibideau.
5. Dr. Hughes - Cross-examination by Mr. Kelly.
6. Questions from audience and Board.
7. Adjournment until 9:30 a.m. Thursday, October 13, 1977.

Day 16 - Session (27) -- Thursday, October 13, 1977
Community Centre, Jarvis.

9:30 a.m.

1. Preliminaries.
2. Mr. S. Bell - Eighth witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.

Day 16 - Session (27) Continued

3. Mr. Bell - Cross-examination by Mr. Forestell.
4. Mr. Bell - Cross-examination by Mr. Cline.
5. Adjournment - 11:40 a.m. until 1:30 p.m.

Day 16 - Session (28)

1. Mr. Bell - Cross-examination by Mr. Cline continued.
2. Mr. Bell - Cross-examination by Mr. Borkovich.
3. Questions from audience and Board.
4. Adjournment - 5:50 p.m. until 9:30 a.m. Friday, October 14, 1977.

Day 17 - Session (29) - Friday, October 13, 1977
Community Hall, Hamlet of Nanticoke.

9:35 p.m.

1. Preliminaries.
2. Presentation of Brief of Haldimand-Norfolk Christian Farmers' Association - Mr. Vanderkooy.
3. Dr. C. Meresz - Ninth witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.
4. Dr. Meresz - Cross-examination by Mr. Forestell.
5. Dr. Meresz - Cross-examination by Mr. Cline.
6. Dr. Meresz - Cross-examination by Mr. Thibideau.
7. Dr. Meresz - Cross-examination by Mr. Kelly.
8. Questions from audience and Board.
9. Adjournment - 12:00 Noon until 1:45 p.m.

Day 17 - Session (30)

1:50 p.m.

1. Mr. J. Vogt - Tenth witness for the Ministry of the Environment - Examination-in-Chief by Mrs. McCaffrey.
2. Mr. Vogt - Cross-examination by Mr. Forestell.
3. Mr. Vogt - Cross-examination by Mr. Cline.
4. Mr. Vogt - Cross-examination by Mr. Kelly.
5. Questions from audience and Board.
6. Adjournment 3:00 p.m. until 2:00 p.m. Monday, October 17, 1977.

Day 18 - Session (31) -- Monday, October 13, 1977
Community Centre, Jarvis.

2:10 p.m.

1. Preliminaries - Filing of Exhibits etc.
2. Presentation - Eastern Lake Erie Trawlers Association
Mr. C. H. Gamble - President.
3. Mr. G. Pearce - Substituting for Dr. M. Palmer -
Eleventh witness - Ministry of the Environment
Examination-in-Chief - Mrs. McCaffrey.
4. Mr. Pearce - Cross-examination by Mr. Forestell.
5. Mr. Pearce - Cross-examination by Mr. Cline.
6. Mr. Pearce - Cross-examination by Mr. Thibideau.
7. Questions from audience and Board.
8. Adjournment - 4:50 p.m. until 8:00 p.m. - Night Sitting.

Day 18 - Session (32) -- Monday, October 13, 1977
(NIGHT SITTING) Community Centre, Jarvis.

8:00 p.m.

1. Preliminaries - Filing of Exhibits etc.
2. Mr. L. Kennaley - First witness - Regional Municipality of
Haldimand-Norfolk - Examination-in-Chief by Mr. Cline.

Day 18 - Session (32) Continued

3. Mr. Kennaley - Cross-examination by Mr. Kelly.
 4. Mr. Kennaley - Cross-examination by Mrs. McCaffrey.
 5. Mr. Kennaley - Cross-examination by Mr. Forestell.
 6. Questions from audience and Board.
 7. Re-examination by Mr. Cline.
 8. Adjournment - 10:20 p.m. until 10:00 a.m. Tuesday, October 18, 1977.
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Day 19 - Session (33) -- Tuesday, October 18,
Community Centre, Jarvis.

10:00 a.m.

1. Preliminaries - Filing of Exhibits etc.
2. Mr. S. Love - Second witness for the Regional Municipality of Haldimand-Norfolk - Examination-in-Chief by Mr. Cline.
3. Adjournment - 12:55 p.m. until 2:00 p.m.

Day 19 - Session (34)

1. Mr. Love - Examination-in-Chief by Mr. Cline continued.
 2. Mr. Love - Cross-examination by Mr. Thibideau.
 3. Mr. Love - Cross-examination by Mr. Kelly.
 4. Mr. Love - Cross-examination by Mrs. McCaffrey.
 5. Mr. Love - Cross-examination by Mr. Forestell.
 6. Questions from Board and audience.
 7. Mr. Love - re-examination by Mr. Cline.
 8. Adjournment - 5:25 p.m. until 9:30 a.m. Wednesday, October 19, 1977.
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Day 20 - Session (35) -- Wednesday, October 19, 1977
Community Centre.

9:35 p.m.

1. Preliminaries.
2. Mr. P. K. Lee - Third witness for the Regional Municipality of Haldimand-Norfolk - Examination-in-Chief by Mr. Cline.
3. Mr. Lee - Cross-examination by Mr. Thibideau.
4. Mr. Lee - Cross-examination by Mr. Kelly.
5. Mr. Lee - Cross-examination by Mr. Forestell.
6. Questions from Board and audience.
7. Adjournment - 12:20 p.m. until 2:00 p.m.

Day 20 - Session (36)

2:00 p.m.

1. Preliminaries - Filing Exhibits etc.
2. Mr. Lee - Re-examination by Mr. Cline.
3. Mr. Sykes - First witness for Haldimand-Norfolk Pollution Control Committee - Examination-in-Chief by Mr. Kelly.
4. Mr. Sykes - Cross-examination by Mr. Thibideau.
5. Mr. Sykes - Cross-examination by Mr. Cline.
6. Mr. Sykes - Cross-examination by Mrs. McCaffrey.
7. Mr. Sykes - Cross-examination by Mr. Forestell.
8. Mr. Sykes - Re-examination by Mr. Kelly.
9. Adjournment - 5:10 p.m. until 8:00 p.m.

Day 20 - Session (37)
(NIGHT SITTING)

8:00 p.m.

1. Mr. C. Shultz - Fourth witness for the Regional Municipality of Haldimand-Norfolk - Examination-in-Chief by Mr. Cline.

Day 20 - Session (37) Continued

(NIGHT SITTING)

2. Mr. Shultz - Cross-examination by Mr. Forestell.
3. Questions from Board and audience.
4. Mr. R. Rakoczynski - Witness for Nanticoke Waste Management Limited - Examination-in-Chief by Mr. Forestell.
5. Mr. Rakoczynski - Cross-examination by Mr. Cline.
6. Questions from Board and audience.
7. Adjournment - 12:00 Midnight until 10:00 a.m. Thursday, October 20, 1977.

Day 21 - Session (38) -- Thursday, October 20, 1977
Community Centre, Jarvis.

10:00 a.m.

1. Preliminaries.
2. Mr. A. MacMillan - First witness for the Haldimand Federation of Agriculture - Examination-in-Chief by Mr. Thibideau.
3. Mr. H. Eubank - Second witness for the Haldimand Federation of Agriculture - Examination-in-Chief by Mr. Thibideau
4. Questions by Mrs. McCaffrey, Mr. Forestell and the Board.
5. Further questions by Mr. Thibideau.
6. Mr. J. Wilkinson - Third witness for the Haldimand Federation of Agriculture - Examination-in-Chief by Mr. Thibideau.
7. Mr. Wilkinson - Cross-examination by Mr. Cline.
8. Mr. Wilkson - Cross-examination by Mrs. McCaffrey.
9. Adjournment - 12:15 p.m. until 1:30 p.m.

Day 21 - Session (39) -- Thursday, October 20, 1977
Community Centre, Jarvis.

1:30 p.m.

1. Presentation - Pollution Probe, Toronto.
 2. Questions.
 3. Mr. Wilkinson - Cross-examination by Mr. Forestell.
 4. Questions from Board and audience.
 5. Re-examination by Mr. Thibideau.
 6. Dr. J. Scharer - Fourth witness for the Haldimand Federation of Agriculture - Examination-in-Chief by Mr. Thibideau.
 7. Dr. Scharer - Cross-examination by Mr. Cline.
 8. Dr. Scharer - Cross-examination by Mrs. McCaffrey.
 9. Dr. Scharer - Cross-examination by Mr. Forestell.
 10. Questions from audience.
 11. Mr. W. Gordon - Fifth witness for the Haldimand Federation of Agriculture - Examination-in-Chief by Mr. Thibideau.
 12. Mr. Gordon - Cross-examination by Mr. Cline.
 13. Mr. Gordon - Cross-examination by Mrs. McCaffrey.
 14. Mr. Gordon - Cross-examination by Mr. Forestell.
 15. Mr. Gordon - Re-examination by Mr. Thibideau.
 16. Dr. Hughes - Cross-examination by Mr. Forestell.
 17. Filing of Exhibits.
 18. Meeting of Counsel to set date for Argument.
 19. Adjournment 4:55 p.m. - until 9:30 a.m. Monday, December 5, 1977.
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Day 22 - Session (40) -- Monday, December 5, 1977
Community Hall, Hamlet of Nanticoke.

9:35 a.m.

1. Preliminaries-Filing of Exhibits.
-Objections to Globe and Mail article.
2. Summary and Argument - Mr. Forestell - representing
Nanticoke Waste Management Limited.
3. Summary and Argument - Mrs. McCaffrey - representing
the West Central Region of the Ministry of the Environment.
4. Adjournment - 12:30 p.m. until 2:00 p.m.

Day 22 - Session (41)

2:10 p.m.

1. Preliminaries - Motion for Judicial Review.
2. Adjournment sine die - 2:25 p.m.

Day 23 - Session (42) -- Thursday, February 16, 1978
Community Centre, Jarvis.

1. Preliminaries - Filing of exhibits, etc.
2. Final Argument - Mr. Cline representing the Regional
Municipality of Haldimand-Norfolk.
3. Adjournment - 11:45 a.m. until 1:00 p.m.

Day 23 - Session (43)

1:10 p.m.

1. Argument - Mr. N. Borkovich - representing the Nanticoke
Ratepayers' Association.

Day 23 - Session (43) Continued

2. Argument - Mr. W. Kelly - representing the Jarvis Board of Trade.
3. Argument - Mr. L. P. Thibideau - representing the Haldimand Federation of Agriculture.
4. Reply - Mr. M. P. Forestell - representing Nanticoke Waste Management Limited.
5. Closing remarks - Chairman.
6. Hearing closed - 4:05 p.m.

ENVIRONMENTAL ASSESSMENT BOARD

PUBLIC HEARING RE:
REGIONAL MUNICIPALITY OF HALDIMAND-NORFOLK/
CITY OF NANTICOKE
NANTICOKE WASTE MANAGEMENT LIMITED

LIST OF EXHIBITSJune 7, 1977 Sessions:

- Exhibit No. 1 - Memorandum from D. P. Caplice, Director, Environmental Approvals Branch, Ministry of the Environment, to Mr. T. M. Murphy, Secretary, Environmental Assessment Board, requesting the Board to hold a public hearing.
- " No. 2 - Tear sheets from the Hamilton Spectator, Simcoe Reformer, Waterford Star, containing the Notice of the hearing which were received by the Board up to and including June 6, 1977.
- " No. 3 - Brief from Mr. Gordon I. Miller, M.P.P., Haldimand-Norfolk, dated June 6, 1977, addressed to Mr. T. M. Murphy, Secretary, Environmental Assessment Board, re: Public Hearing, Landfill Site and Liquid Waste Treatment Facility, Nanticoke Waste Management Limited.
- " No. 4 - Telephoned telegram from Catherine Brooks, President, Port Dover Board of Trade, addressed to Mr. T. M. Murphy - received by telephone June 2, 1977.
- " No. 5 - Four aerial photographs taken by Mr. Ron E. Johnson, Provincial Officer, Ministry of the Environment on June 3, 1977:
- a - aerial view of site looking south;
 - b - aerial view of site looking south-southwest;
 - c - aerial view of site looking west;
 - d - aerial view of site looking north.
- " No. 6 - Submission to the Environmental Assessment Board by Mr. H. H. Eisler, Environmental Control Manager, Steel Company of Canada Limited (2 pages)
- " No. 7 - Brief presented by Mr. Thomas W. Drew, President, Nanticoke Waste Management Limited (12 pages).

ENVIRONMENTAL ASSESSMENT BOARD

PUBLIC HEARING RE:
REGIONAL MUNICIPALITY OF HALDIMAND-NORFOLK/
CITY OF NANTICOKE
NANTICOKE WASTE MANAGEMENT LIMITED

LIST OF EXHIBITS

-2-

- Exhibit No. 8 - Three large coloured paintings showing artist's concept of:
- a - plot of site
 - b - scientific landfill area No. 6
 - c - profile from Concession road.
- " No. 9 - Letter brief from Mr. Thomson of Cameron Thomson Water Haulage dated June 7, 1977
- " No.10 - Letter brief dated June 7, 1977, signed by Messrs. Wayne and Len Lindsay of Lindsay Water Haulage.
- " No.11 - Letter brief dated June 7, 1977, signed by Mr. Ross Macdonald, President, Elmcrest Associates.
- " No.12 - Four-page handwritten brief signed by Edith Fuller, dated June 4, 1977.
- " No.13 - Letter brief dated June 1, 1977, addressed to the Environmental Assessment Board from Ross Macdonald and Pansie V. Macdonald.
- " No.14 - Copy of a resolution passed by the Council of the City of Nanticoke at its meeting of May 31, 1977, addressed to The Honourable George A. Kerr.
- " No.15 - Original telegram mentioned in Exhibit No. 4.
- " No.16 - Letter brief dated May 6, 1977 from Walter Warshawsky and Nina Warshawsky.
- " No.17 - Letter of the 27th of May, 1977 from Mr. R. J. Spence, P.Eng., Environmental Protection Officer, Canadian National to F. A. Voegel.
- " No.18 - Brief (one page) from the Nanticoke Rate-payers Association, signed by the Executive Board, re: Proposed Toxic Waste Disposal Site, City of Nanticoke, Regional Municipality of Haldimand-Norfolk.

ENVIRONMENTAL ASSESSMENT BOARD

PUBLIC HEARING RE:
REGIONAL MUNICIPALITY OF HALDIMAND-NORFOLK/
CITY OF NANTICOKE
NANTICOKE WASTE MANAGEMENT LIMITED

LIST OF EXHIBITS

-3-

Week of August 9-12, 1977:

- Exhibit No. 19 - Letter from Mr. Art Renn, President, Norfolk Federation of Agriculture to Chairman, Environmental Assessment Board dated June 1, 1977
- " No. 20 - Brief to Environmental Assessment Board from Ethel L. Kindree dated June 7, 1977
- " No. 21 - No exhibit assigned this number.
- " No. 22 - Letter to Environmental Assessment Board dated June 9, 1977 from Mrs. Edna Banfield, Recording Steward, Nanticoke Pastoral Charge, United Church of Canada, Nanticoke.
- " No. 23 - Letter to E.A.B. dated June 15, 1977 from Mrs. James W. Lindsay, Superintendent of Nanticoke United Church Sunday School
- " No. 24 - Letter dated June 16, 1977 to E.A.B. from Madeline Thomson, President and Lorraine Thomson, Secretary, Nanticoke United Church Women
- " No. 25 - Letter dated July 4, 1977 to Environmental Assessment Board signed by Mrs. Victor Anderson, Secretary-Treasurer, Mrs. Herb. Martindale, President, Mrs. John A. Fleming, Resolutions Convenor, and Mrs. William Lamb, Public Relations Officer, all of the Haldimand West Women's Institute.
- " No. 26 - Copy of letter addressed to The Honourable G. Kerr, Minister of the Environment, dated July 7, 1977 signed by Charles H. Gamble, President, The Eastern Lake Erie Trawlers Association.
- " No. 27 - Copy of letter dated July 7, 1977 addressed to Mr. Wm. E. Kelly, Barrister, signed by Mr. G. Hobbs, Nanticoke.
- " No. 28 - Copy of letter dated July 28, 1977 addressed to the Haldimand West Women's Institute from The Honourable G. A. Kerr, acknowledging its letter of July 4, 1977 which was forwarded to the Board.

ENVIRONMENTAL ASSESSMENT BOARD

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NANTICOKE WASTE MANAGEMENT LIMITED

LIST OF EXHIBITS

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Week of August 9-12, 1977 (cont'd.):

- Exhibit No. 29 - Copy of letter dated August 3, 1977 addressed to Mrs. Smuk, President, West Haldimand Women's Institute from William G. Davis, Premier of Ontario, acknowledging her letter of June 25 and stating that it was forwarded to the Assessment Board.
- " No. 30 - Letter from JoAnn Opperman dated August 4, 1977 attached to brief from Pollution Probe, Toronto to Assessment Board.
- " No. 31 - Letter dated August 4, 1977 to Environmental Assessment Board from Mrs. Nancy Huxley, writing on her own behalf.
- " No. 32 - Copy of brief and attached enclosures dated July 20, 1977 addressed to The Honourable George Kerr, from Mrs. Muriel Buckley.
- " No. 33 - Brief to the Environmental Assessment Board from The Haldimand-Norfolk Christian Farmers Association dated August 9, 1977.
- " No. 34
(A) - Assessment of the proposal submitted by Nanticoke Waste Management Limited for the establishment of a liquid industrial waste treatment facility and landfill site at Nanticoke prepared by a multi-disciplinary group working within the Ministry of the Environment
- " No. 34
(B) - Assessment of Liners for lagoons and landfill site prepared by S. Bell, Senior Approvals Engineer, Industrial Approvals Section, Environmental Approvals Branch, Ministry of the Environment
- " No. 35
A - J: Aerial photos taken by Mr. R. Johnson, M.O.E. labelled as follows:
- A- Nanticoke Generating Station Nanticoke Creek
- B- Mouth of Nanticoke Creek showing location of creek to generating station
- C- Mouth of Nanticoke Creek showing plume

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Week of August 9-12, 1977 (cont'd.):

Exhibit No. 35 A-J (cont'd.):

- D- Nanticoke Creek Looking north toward site
- E- Nanticoke Creek Town of Nanticoke in relation
to site
- F- Site looking south
- G- Site looking south showing drainage pattern
- H- Showing site location - looking west (showing
discharge route)
- I- Discharge point into Nanticoke Creek
- J - Looking east from discharge point on Nanticoke
Creek to site
- " No. 36 - Copy of an agreement dated June 2, 1977 between
Nanticoke Waste Management Limited and SCA
Services, Inc.
- " No. 37 - Copy of Application for a Certificate of
Approval for a Waste Disposal Site to Ministry
of Environment dated May 6, 1976 and attached
supporting information form from Nanticoke
Waste Management Ltd. signed by Thomas W. Drew
re waste disposal site proposed to be located
on south half lot 6 concession 4 (in former
Twp. of Walpole) City of Nanticoke
- " No. 38 - Copy of
Application to MOE for approval of plans and
specifications for the construction of works
for the collection, transmission, treatment
and disposal of liquid industrial wastes proposed
to be located on Lot 6, concession 4 (in former
Twp. of Walpole) City of Nanticoke signed by
Thomas W. Drew dated Nov. 3/76.
- " No. 39 - Nanticoke Waste Management Facility Proposal
submitted by The D & D Group/Chem-Trol
Pollution Services, Inc. Division of SCA
issued on Sept. 16, 1976
- " No. 40 - Addendum to Nanticoke Waste Management Facility
Proposal.
- " No. 41 - Copy of letter and attached information (3 pages)
from Paul G. Sturdivan, Product Manager,
Engineering, Demco Inc. to Chem-Trol Pollution
Services Inc. dated Sept. 20, 1976 re Centri-
fugal Separators.

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Week of August 9-12, 1977 (cont'd.):

- Exhibit No. 42 - Copy of letter dated Oct. 4, 1976 to Mr. Thomas Drew from Mr. S. B. Bell, MOE, re Nanticoke Waste Management Facility
- " No. 43 - Copy of letter dated Oct. 22, 1976 to Mr. Thomas Drew from S. B. Bell, MOE re Nanticoke Waste Management Facility
- " No. 44 - Copy of letter dated Nov. 9, 1976 to Mr. Thomas Drew from S. B. Bell, MOE, re Nanticoke Waste Management Facility
- " No. 45 - Copy of letter and attached information (2 pages) dated Nov. 29, 1976 from Dr. Kenneth C. Malinowski, Chem-Trol Group to Mr. S. B. Bell, MOE
- " No. 46 - Copy of letter dated December 29, 1976 and three (3) pages of information addressed to Mr. T. W. Drew from Robert A. Stadelmaier, Director of Research, Chem-Trol Waste Division
- " No. 47 - Copy of letter dated Jan. 21, 1977 containing information and comments re Nanticoke Waste Management Limited addressed to Thomas W. Drew from S. B. Bell, MOE.
- " No. 48 - Copy of letter dated Jan. 24, 1977 addressed to Mr. S. B. Bell, MOE from Mr. Thomas W. Drew
- " No. 49 - Drawing No. CPD-235 entitled Nanticoke Waste Management Facility Elevational Views dated 10-4-76
- " No. 50 - Drawing No. CPD-234 entitled Nanticoke Waste Management Facility dated 9-14-76
- " No. 51 - Letter dated July 26, 1977 from Mrs. Linda McCaffrey to All Interested Parties, EAB hearing and Dr. G. Craig's (MOE) set of preliminary biological requirements for the effluent from the plant.
- " No. 52 - Map showing locations of other properties in City of Nanticoke and comments by Mr. Drew regarding them

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LIST OF EXHIBITS

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Week of August 9-12, 1977 (cont'd.):

- Exhibit No. 53 - Listing of properties viewed in addition to 14 shown on Exhibit 52
- " No. 54 - Copy of Proposed Loan Agreement dated Feb. 2, 1977 between Ontario Development Corporation and Nanticoke Waste Management Limited
- " No. 55 - Ministry of the Environment Water Resources Map 3112 titled Ground Water Probability, County of Haldimand, 1974
- " No. 56 - Resume of Mr. D. L. Colborne, Eastern Canadian Manager, Staff Industries Canada Ltd.
- " No. 57 - Resume of Staff Industries Canada Ltd.
- " No. 58A- List of locations of installations where Chlorinated Polyethylene (CPE) lining was used and associated applications
- " No. 58B- Partial list of Staff Oil-Resistant PVC Linings --locations and application types
- " No. 59A- Partial List of Dam and Tailing Installations
- " No. 59B- Partial List of Staff Thickener Installations and uses
- " No. 60 - Major project list with associated details concerning installations
- " No. 61 - Board displaying Staff brochures
- " No. 62 - Board displaying lining materials
- " No. 63 - Board displaying photographs of installation of lining materials
- " No. 64 - Statement from Hilda Awde, Jarvis - read into record on August 12, 1977 by Wm. Kelly
- " No. 65 - Statement signed by Gordon & Audrey Mitchell R.R. #3, Jarvis addressed to EAB - read by Wm. Kelly

PUBLIC HEARING #1:
REGIONAL MUNICIPALITY OF HENRIK HARTFORD/
CITY OF NANTICOKE
NANTICOKE WASTE MANAGEMENT LIMITED

LIST OF EXHIBITS

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Week of August 9-12, 1977 (cont'd.):

- Exhibit No. 66 - Statement signed by Wilfred and Gay Devries
R.R. #1 Nanticoke addressed to EAB read by
Wm. Kelly
- " No. 67 - Statement signed by Dick and Liz DeVries
R.R. #1 Nanticoke addressed to EAB read by
Wm. Kelly
- " No. 68 - Brief presented by Richard Walker representative
of Norfolk Federation of Agriculture.

Week of August 16-19, 1977:

- " No. 69 - Letter dated August 18, 1977 from Catherine
C. Brooks, President, Port Dover Board of Trade
- " No. 70 - Booklet (37 pages) entitled, The Choice is
Clear, by Dr. Allen E. Banik
- " No. 71 - Brief on The Status of Liquid Industrial Wastes
Disposal in Ontario, August 1977, prepared by
E. W. Turner, M.O.E.
- " No. 72 - Report (SW-137) on Liners for Land Disposal
Sites, An assessment. U.S. Environmental
Protection Agency, 1975, written by Allen J.
Geswein
- " No. 73 - Booklet entitled Guidelines and Criteria for
Water Quality Management in Ontario produced
by the Ministry of the Environment
- " No. 74 - Booklet entitled, Objectives, produced by the
Ministry of the Environment.

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LIST OF EXHIBITS

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- Exhibit No. 75 - Circulation and Water Movement in Lake Erie, P. F. Hamblin, Inland Waters Branch, Dept. of Energy, Mines and Resources, Ottawa, Canada 1971.
- " No. 76 - Lake Erie - Nanticoke Generating Station Nearshore Currents 1974 Design and Development Division, Ontario Hydro.
- " No. 77 - Water Movements in the Nanticoke Region of Lake Erie 1974, Ministry of the Environment February 1976.
- " No. 78 - Water Currents in the Nanticoke Area of Lake Erie, 1967 - 1970, M. D. Palmer, Ministry of the Environment, R. A. Walker, Ontario Hydro.
- " No. 79 - The Aquatic Ecosystem of Long Point Bay in the Vicinity of Nanticoke, 1967 - 1971, A Summary Report, May 1973. Prepared by The Nanticoke Environmental Committee.
- " No. 80 - Telegram from Nancy Huxley and Peggy Scruton to the Honourable George Kerr received August 11, 1977.
- " No. 81 - Letter addressed to the Honourable George Kerr from Mrs. J. B. Linklater, Jarvis, Ontario, dated July 27, 1977.
- " No. 82A- Letter to the Environmental Board of The City of Nanticoke dated September 22, 1977 signed by Cyril Steffler, President, Agnes Clark, Vice-President, Ruth Eastbury, Treasurer, and Zahlia St. James, Secretary, of the Hickory Beach Cottagers Association.
- " No. 82B- Map of Long Point Bay, Canadian Hydrographic Service, Ottawa.

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LIST OF EXHIBITS

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Week of September 26 - 30, 1977

- Exhibit No. 83 - Sub Cell Plan and Detail "A" Typical Leachate Standpipe, Proposed Nanticoke Waste Management Facility. (2 Pages)
- " No. 84 - Letter to the Chairman, Environmental Assessment Board from Verge Insurance Agencies Limited signed by Ross Williams dated August 15, 1977 regarding insurance coverage on D & D Disposal Services Ltd.
- " No. 85 - Calculation of time it would take leachate to travel through silty clay with a permeability of less than 1×10^{-7} cm/sec. Made on August 11, 1977 by Mr. D. Kuhn.
- " No. 86 - Petition submitted by Nanticoke Ratepayers Association addressed to The Honourable George Kerr, Minister of the Environment and to the Environmental Assessment Board. 35 pages.
- " No. 86A- Addition to above petition 3 pages.
- " No. 87 - Origin, Classification and Uses of Ontario Soils Publication 51, Department of Agriculture and Food, Ontario.
- " No. 88 - Dissolved Solids Loadings to Long Point Bay, Ministry of the Environment, September 26, 1977.
- " No. 89 - Notice of Motion re staying of proceedings to the Environmental Assessment Board from Nanticoke Ratepayers Association per Nick Borkovich dated September 27, 1977.
- " No. 90 - Notice of Motion to Environmental Assessment Board "to not issue or refuse to issue a report" from Regional Municipality of Haldimand-Norfolk per Cline and Backus dated September 26, 1977.

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Week of September 26 - 30, 1977 (cont'd.):

- Exhibit No. 91 - Copy of letter from George G. Raine, Community Relations Stelco to Mr. and Mrs. Tomkins dated 2 November 1976.
- " No. 92 - Brief addressed to the Environmental Assessment Board from Rev. Bob Hyde, Hagersville, Ont. dated September 27, 1977. (4 pages)
- " No. 93 - Letter to the Environmental Assessment Board from Cornelius Maas and Family, Nanticoke, dated September 27, 1977.
- " No. 94 - Brief from Nancy Huxley to Environmental Assessment Board dated September 27, 1977 accompanied by copy of letter from Village of Youngstown and newspaper clippings.
- " No. 95 - Flow Chart showing Physical/Chemical Treatment of Liquid Inorganic Industrial Wastes submitted by Ministry of the Environment.
- " No. 96 - Waste Classification Code and Source Totals prepared by Pollution Control Branch, Ministry of the Environment.
- " No. 97 - Letter from Mrs. Gerald Donaldson to the Environmental Assessment Board dated September 28, 1977.
- " No. 98 - Letter to the Environmental Assessment Board dated September 28, 1977 from Robert and Elsie Doughty, R.R. #2, Nanticoke, Ontario.
- " No. 99 - Appendix D - Conceptual Approach - Final Effluent Monitoring - SPDES Permit NY 007 2061 Chem-Trol Pollution Services, Inc., Model City, N.Y.
- " No. 100 - Report on Chlorinated Hydrocarbon Residues From Selected Sites on Lakes Ontario, Erie and St. Clair 1975 by K. Suns and G. Rees, Ministry of the Environment.

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- Exhibit No. 101 - Copy of letter from Ontario Research Foundation dated August 24, 1977, to Mr. T. Drew re sampling and analytical services.
- " No. 102 - Ministry of Environment form entitled Application for a Certificate of Approval for a Waste Disposal Site.
- " No. 103 - Ministry of Environment form entitled Supporting Information to an Application for Approval of a Landfill Disposal Site.
- " No. 104 - Listing of Additional Information related to Nanticoke Hearing dated October 7, 1977 addressed to Linda McCaffrey from Mr. S. Beszedits, Ministry of Environment.
- " No. 105 - Letter dated October 4, 1977 addressed to D. S. Caverly from Allen W. Ballett, Secretary-Treasurer, D & D Disposal Services Limited regarding amount expended toward application for approval.
- " No. 106 - Information dated June 30, 1977 from Dr. K.C. Malinowski to T. W. Drew regarding proposed biological testing programme.
- " No. 107 - Letter from SCA Services, Inc. dated September 27, 1977 addressed to Mr. Paul Forestell, signed by Peter Dunlap, Assistant General Manager, Chemical Waste Division.
- " No. 108 - Hydrogeologic Considerations in the Design of a Permanent Subsurface Industrial Waste Storage Facility, Dr. George Hughes, Ministry of the Environment.
- " No. 109 - Personal Data on Dr. George Hughes.
- " No. 110 - Letter from Donald J. Kahn dated October 6, 1977 addressed to Mr. Thomas W. Drew regarding costs of berms.

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- Exhibit No. 111 - Letter from D. L. Colbourne Staff Industries dated October 11, 1977 addressed to Mr. P. Forestell re answers to questions raised previously related to specs for liner, company's involvement in installations in Canada and failures information.
- " No. 112 - Memo from G. R. Craig, Water Resources Branch, Ministry of the Environment re fish body burdens in Long Point Bay dated October 14, 1977. Reference paper by Kelso and Frank.
- " No. 113 - Letter from R. A. Stadelmaier to Mr. Paul Forestell with nine attachments indicating results of analyses of samples from Chem-Trol.
- " No. 114 - Statistical information pertaining to intakes at Ontario Hydro Nanticoke Power Plant.
- " No. 115 - Letter from Ernest R. Gedeon, Associate Public Health Sanitarian, Niagara County Health Dept., Lockport, New York, U.S.A. to Mr. Syd Love re Chem-Trol Pollution Services, Balmer Road, Town of Porter. Appendix D enclosed.
- " No. 116 - True copy of a resolution of the Council of the City of Nanticoke passed on September 13, 1977.
- " No. 117 - True copy of a resolution of the Regional Council of the Region of Haldimand-Norfolk passed on September 8, 1977.
- " No. 118 - Overall Map of Regional Municipality of Haldimand-Norfolk.
- " No. 119 - Map of former Twps. of Walpole and of Woodhouse showing D & D Site in relation to Industrial Park, Stelco Mill, Hydro and Texaco sites. Coloured areas with legend.
- " No. 120 - Protective Covenants for Lake Erie Industrial Park.

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- Exhibit No. 121 - Labels to be used to identify type of contents of containers being transported.
- " No. 122 - Application for Public Access to Records used by Mr. L. S. Love on October 5, 1977 to obtain information from records of Niagara County Health Department.
- " No. 123 - Brochures on L. S. Love and Associates Limited.
- " No. 124 - Memorandum from Edwin L. Vopelak, Chief Hearing Officer, New York State Dept. of Environmental Conservation re SPDES Application from Chem-Trol Pollution Services, Inc.
- " No. 125 - Chem-Trol Sampling Results - Chlorinated Hydrocarbons. Ground Water Monitoring Well.
- " No. 126 - Results of Examination of samples taken from West Facultative Lagoon, Chem-Trol Pollution Services, Inc. on 1976, Oct. 6th 1400 hrs.
- " No. 127 - Lab analytical results produced at L.S. Love & Associates Lab on 2 samples collected from Chem-Trol on October 10, 1977.
- " No. 128 - Data Comparison Table for (4) four samples collected at various times from Chem-Trol Ponds.
- " No. 129 - Agreement between the Regional Municipality of Haldimand-Norfolk and The Corporation of the City of Nanticoke and The Steel Company of Canada dated June 1, 1977.
- " No. 130 - Letter to Mr. Paul Forestell dated October 12, 1977 from Randolph Rakoczynski, Plant Manager, Chem-Trol re tour of Chem-Trol facility by Mr. Syd Love on Monday, October 10, 1977.
- " No. 131 - Final Modifications to Effluent Testing. Agreed to by Chem-Trol and NYSDEC Albany.

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- Exhibit No. 132 - Personal Data on Patrick K. Lee, P.Eng.
- " No. 133 - Map of Landfill Site in Region of Haldimand-Norfolk with details of their status.
- " No. 134 - Report on NATO CCMS Pilot Study on the Disposal of Hazardous Waste - Sub-project "Landfill"
Author - F. Defregger
- " No. 135 - National Solid Wastes Management Association Report entitled Calming public hysteria on hazardous wastes.
- " No. 136 - University of Wisconsin - Extension Landfill Course Lesson #6 entitled Gathering Data: most important step in designing landfill.
John Reindl
- " No. 137 - Article by Leonard S. Wegman, P.E. entitled New-type Landfills Meet Long-Term Disposal Needs.
- " No. 138 - A Summary of Contaminant Levels in the Long Point Bay Fishery prepared by Technical Support Section, West Central Region, Ontario Ministry of the Environment.
- " No. 139 - Response to Questions from Hearing Board regarding Nanticoke Waste Management Hearing Ministry of the Environment West Central Region.
- " No. 140 - Index 10A Wastes Requiring Disposal Off-Site by Industries in the Nanticoke Area - Ministry of the Environment.
- " No. 141 - Index 10B Analytical Results Received from New York State Department of Environmental Conservation.
- " No. 142 - Environmental Violations by Chem-Trol Compiled September 24, 1977 - Towns of Lewiston-Porter - by Mr. Calvin Schultz

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- Exhibit No. 143A- Aerial photos of Chem-Trol Site
143B- submitted by Mr. R. Rakoczynski.
- " No. 144 - Letter dated October 20, 1977 to the Environmental Assessment Board from Arnold and Aurora Evans.
- " No. 145 - Information on Flexible Impermeable Membranes supplied by Staff Industries per D. L. Colbourne.
- " No. 146 - Letters from Town of Hamburg and County of Erie Department of Health addressed to Chem-Trol Pollution Services, Inc.
- " No. 147 - Answers provided to questions raised at hearing on October 18, 1977 by Mr. Syd Love.
- " No. 148 - Black and white and coloured photos taken of
A-E Nanticoke Creek by Mr. and Mrs. Alan McMillan on August 12, 1977.
- " No. 149 - Brief concerning Proposed Landfill Site by Haldimand Federation of Agriculture presented by Mr. Eubank.
- " No. 150 - Green Paper on Planning for Agriculture Food Land Guidelines, Ministry of Agriculture and Food, 1977.
- " No. 151 - Report by Golder Associates to James F. MacLaren Ltd. on Compilation of Existing Subsurface Data - Haldimand-Norfolk Sewerage Study - June 1975
- " No. 152 - Brief of Pollution Probe providing additional comment to brief submitted on August 9, 1977 as EXHIBIT 30.
- " No. 153 - Analytical Report of Envirodean Limited.
- " No. 154 - Letter to United Co-operative from Mr. J.M. Dochstader, P.Eng., Ministry of the Environment.

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Exhibit No. 155 - Photos in United Co-operative's area.
A-E

- " No. 156A- Letters from Kernahan & Graves Insurance Limited re Waste Disposal Plant Liability Coverage dated September 14, 1977.
- " No. 156B- similar letter dated October 4, 1977.
- " No. 157 - Official Plan of the Walpole Planning Area.
- " No. 158 - Township of Walpole - The Zoning By-Law as amended.
- " No. 159 - Ontario Regulation #285/73
- " No. 160 - Submissions to the Environmental Assessment Board on behalf of C. J. Macfarlane, Director, West-Central Region, Ministry of the Environment.
- " No. 161 - Map of route to Chem-Trol facility near Lewiston, New York State, U.S.A.
- " No. 162 - Letter dated January 5, 1978 from Mr. Thomas A. Cline addressed to Environmental Assessment Board Attention: Mr. Fred A. Voegel, enclosing copies of photographs referred to by Calvin Schultz. (24 coloured and 1 black-and-white), of areas in and around Chem-Trol Facility.
- " No. 163 - Judgment No. 6979/77 dated January 25, 1978, of Mr. Justice J. Goodman In Chambers, In The Supreme Court of Ontario Between Nanticoke Ratepayers Association, Applicant and Environmental Assessment Board, The Ministry of the Environment, Nanticoke Waste Management Limited, The Regional Municipality of Haldimand-Norfolk, Haldimand Federation of Agriculture and Citizens Committee for the Preservation of the Environment, Respondents

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